CREATIVITY: A HIGHER ORDER CAPABILITY

Investigating:

How creativity is made teachable in design education.

By

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C02042: Doctor of Education (EdD) Dissertation

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledge within the text.

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PREFACE

The Doctor of Education (EdD) is a professional doctorate. It is distinguishable from traditional PhD studies by an applied academic focus on designated areas of professional practise. An important goal of EdD research is to produce 'useful knowledge (that makes) a contribution to the development of professional workers *in the field*' (Brennan 1998, pp. 69-76). Creativity: A Higher Order Capability is a primarily conceptual EdD thesis. It concentrates on explicating the multidimensional relevance and operational roles of human creativity at the intersections of three professional domains in Design, Education and Design Education. The thesis explores conceptual and theoretical underpinnings for creativity in design education using new and existing knowledge to inform and potentially improve creative practises in teaching and learning. The thesis does not present a procedural approach to design or teaching practises. It does not research or recommend particular formulae or techniques or 'recipes' for selecting design content or sequencing design exercises or setting interesting learning assignments or making studio or classroom activities more measurably creative. Instead the thesis draws on very wide ranging research to examine the holistic nature of human creativity as 'lived experience' for design practitioners, teachers and students. The thesis expounds the situated dynamics impacting self-knowledge and identity formation in design disciplines. This is coupled with analyses of interpersonal design development and action, in terms of integrated creative embodiment, which both determines and sustains creative 'performativity' in relation to pedagogy and ongoing professional design practise throughout life. In this respect the thesis moves beyond a cognitive preoccupation with 'creative thinking' and procedural 'problem solving' processes. Instead this EdD investigation seeks deeper philosophical, physiological, psychological and sociological insights into what it means and feels like to knowingly 'be creative' and actively teach for creativity in design education. This has pedagogical relevance in community learning environments, schools, vocational colleges, universities, other higher education institutions and professional development contexts including teacher education. Emphasis on design education in the thesis necessitates a primary focus on visual experience, perception and communication. The specificity of other applications of creativity in music, dance, theatre, literature or the sciences for example falls outside the scope of this dissertation. Nevertheless, many underlying pedagogic principles for better appreciating creativity as an embodied higher order capability may also be pertinent to improving practises in other creative arts fields and associated professional domains.

Completion of this thesis on Creativity: A Higher Order Capability coincided with recent re-engagement with the importance of creativity in arts and education through major national and international initiatives. For example, the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) convened a Working Group on *The Role of Creativity in the Innovation Economy* to report late 2005. Also the Australia Council for the Arts hosted a national symposium titled *Backing Our Creativity: Education & the Arts – Research, Policy & Practice* in Melbourne 13-14 September 2005. This event represents the first symposium on creativity in education and the arts to be held in Australia in over a decade. Furthermore, the regional Australian mini-summit is a precursor to the UNESCO World Conference on Arts Education titled *Building Creative Capacities for the 21st Century* to be held in Lisbon Portugal in March 2006.

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ABSTRACT:

Creativity: A Higher Order Capability is a qualitative inquiry that marshals various interpretive strategies to address the problem of 'how' creativity is made teachable in design education. Theoretically, the themes of creativity, design and design education are contextualised and interrelated using selected historical and philosophical approaches. Of most relevance in building a more holistic appreciation of creativity, than that previously offered in the psychological research for example, are certain philosophical insights expounded in differing phenomenological traditions. In particular, theoretical insights into the experiential nature of creativity are drawn from an interpretation of 'being' offered by Martin Heidegger, coupled with a richly physical and sensate analysis of 'embodiment' proffered by Maurice Merleau-Ponty and the socially constructed 'intersubjectivity' provided by Alfred Schutz.

This research explores creativity in terms of higher order capability by focusing attention onto the role of qualitative human attitudes, values and beliefs, which contribute the indispensable emotive underpinning needed for individuals to acquire meaningfully enacted design knowledge, skills and processes through specialised educational practices. Other, more narrowly defined, scientific views of creativity are also canvassed, especially in relation to cognitive psychology and neuroanatomy. Pertinent avenues of educational theory are examined in relation to creative teaching practice. Most notably this includes Lev Semenovich Vygotsky's 'cycle of imagination', the culturally pragmatic perspectives of John Dewey, the principles of 'reflective practice' advocated by Donald Schon and the socially situated learning in 'communities of practice' articulated by Etienne Wenger among others.

It must be acknowledged that much relevant literature dates from the modernist era. This calls for close reading and critical review. Therefore a broadly postmodern perspective has proved useful in tempering and reconciling the researcher's own presuppositions with overly deterministic or contradictory assertions and recurrent reductionist tendencies in the literature. This also helps, when discussing creativity in terms of education, to expose many biased, limited and unhelpful assumptions that persist in confounding and inhibiting serious pedagogical engagement with creativity as an overt focus of teaching and learning. A more expansive understanding of creativity has been synthesised from differing historical and theoretical analyses of creativity. These have been compared with the implicit understandings of practising designers. Recent attitudinal data was obtained using a qualitative questionnaire circulated through the Design Institute of Australia (DIA) asking practitioners for opinions on the nature and relevance of creativity in design practice and design education in Australia.

The present study has seven chapters comprising an Introduction, followed by discussion of Design Context; Design Education; Understanding Creativity; Creativity, Philosophy and Education; Targeting Creativity in Design Education and a brief Conclusion. This draws together a weight of evidence from disparate sources to support the proposition that creativity is not a rare, indeterminate, unitary or linear consideration. Rather, it is asserted that creativity is best understood holistically as a fully physical, emotional and cognitive, as well as iterative and generative, human capability of a high order that is potentially

shared by all design teachers and learners working within overlapping communities of practice.

The cultivation of creative confidence in heart, body and mind through targeted teaching strategies requires development of multidimensional, highly interactive and participatory educational approaches. It is argued that such pedagogical approaches must begin with an awareness of the characteristically adaptive and fluid nature of creativity in response to change and the particularities of content, opportunities and circumstances governing each and every application. Teaching strategies may then be developed to prompt and sustain affective engagement with what it means and feels like to 'be' intentionally creative in a given field. This investigation argues that this can most readily be achieved when teachers and learners engage proactively with 'potentialities' via the production of future-oriented modes of learning. Creative modes of learning deal not so much with 'what is' but with 'what-might-be' using rhetorical questions such as *'What if?'* and *'Why not?'*. Open-ended strategies like this operationalise creativity in education to stimulate curiosity and exploration, and guide praxis in design or indeed in any other field of endeavour where creativity is considered advantageous.

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Chapter 1:

<u>INTRODUCTION</u>

Creativity: A Higher Order Capability is an expansive topic. The inquiry draws freely on interdisciplinary bodies of knowledge, and the associated literatures, to investigate the relevance and application of creativity across three intersecting professional domains of design practice, education practice and design education practice. To assist understanding of the key issues, a structural and conceptual overview of the study is briefly introduced to establish the scope and parameters of the inquiry. Qualitative research presented in subsequent chapters then examines the affective dimensions of what constitutes creativity as a higher order human capability and discusses how creativity is made teachable in design education.

Overwhelmingly, responses to a targeted questionnaire on creativity, circulated for the purposes of this research amongst members of the Design Institute of Australia (DIA), a peak professional body, confirm that creativity is unequivocally deemed to be an 'essential' aspect of design education. It is perhaps not surprising that designers should implicitly consider creativity a critically important outcome of design education. However this conviction amongst practitioners begs the underlying pedagogical question of exactly 'how' creativity might be better understood and therefore potentially more overtly targeted in teaching and learning practices in design and other fields. This exegesis progressively unpacks and scrutinises the many values, beliefs, assumptions and assertions about the nature of creativity that impact on the efficacy of design education priorities and practices in Australia and elsewhere.

Structure of the inquiry

Chapter 1 provides a thesis statement and postmodern positioning for this qualitative investigation. Research design and the hermeneutic methodology adopted in response to implications drawn from a wide-ranging review of literature pertaining to human creativity is discussed in Chapter 2. In Chapters 3 and 4 important background

information on design context and design education respectively is examined adopting a broadly historical perspective. Here design specific issues are differentiated from parallel considerations in art, craft and science, which gave impetus to the rise of design education as a separate academic and professional discipline during the twentieth century. This backgrounding situates the importance of creativity as a higher order capability in relation to design practice and to design education as two distinct but closely interrelated professional communities of professional practice. Here pivotal questions are addressed such as *'What is design?'*, *'What constitutes and characterises design education?'*, *'Why is fostering creativity so important in design education?'* and *'What educational theories underpin design education?'*.

In responding to the vexed definitional question *'What is creativity?'* a comparative examination of key theoretical developments responsible for introducing various, still prevalent, pre-understandings of creativity follows in Chapter 5. This lays the groundwork for an exploration of more holistic ways of conceptualising and re-conceptualising creativity that go some way toward reconciling individual with differing communal, contextual and theoretical frames of reference. Extended discussion in Chapter 6 looks to establish a more expansive and affective understanding of the interpretive interface between creativity, philosophy and education. Here experiential notions of praxis and action, social relevance, subjectivity and intersubjectivity, human agency and understanding of what it means to 'be creative' are expounded. This leads into a careful analysis of selected philosophical arguments focussed on apprehending the sensate in embodied creativity, which leans toward a possible pedagogy of creativity for both teachers and learners that foregrounds practical reasoning and fully embodied dispositions.

Culminating argument is presented in Chapter 7 targeting creativity in design education where a previously introduced heuristic Operational Model of Creative Questioning demonstrates 'how' creativity is made teachable in design education. The pedagogical relevance of this exemplar helps locate creativity within design, education and design education as three overlapping communities of practice by analysing creativity from a 'performative' viewpoint. The heuristic value of this modelling of creative questioning

provides a guide or selective template to help teachers formulate creatively oriented approaches to teaching and learning design. The intention is to improve understanding and potentially increase the creative confidence and effectiveness of teaching and learning in design education. In Chapter 8 the foregoing research is briefly summarised, drawing conclusions and offering observations and arguments associated with increasing political emphasis on fostering innovation through education. Potential relevance of this investigation into creativity as a higher order capability is presented as a contribution to future research and applications in design education and other associated fields, most particularly in teacher education.

Thesis statement

The central proposition advanced in this study is that creativity is not rare. It is argued that creativity is not the serendipitous, abstract and ill-defined human attribute limited to accidents of genetic inheritance, particular personality types or extraordinary intellectual prowess, so often asserted in narrowly prescriptive, but nevertheless inconclusive, positivist theories of the past. Also it should not be assumed that interest in creativity must necessarily only be predicated upon intelligence and the cognitive domain of 'thinking', or the neural anatomy and computational networking of brain science. Though it is acknowledged that recent research in these fields has contributed some interesting background information for the design practitioner and educator to contemplate.

Rather, this inquiry proposes that creativity is ubiquitous as a higher order human capability. As such creativity is thought to be a qualitatively familiar experience, in learning and work, that becomes evident wherever and whenever knowledge and skills are selectively applied and intentionally customised to reconcile apparent life difficulties and respond to variable work demands and opportunities. The following study presents creativity as an holistic and fully embodied experience that can be conscious, intuitive or unconscious. In this respect creativity is held to underpin a wide range of ordinary and extraordinary human activities including teaching and learning. Thus creativity is understood to be a survival instinct that can be recognised as 'felt experience' and purposefully honed. Creativity is especially important when dealing with complexity, where human adaptability and ingenuity are required to meet both routine and unfamiliar

challenges and produce innovative responses to situations for which there may appear to be no obvious strategies or predetermined resolutions. Hence, creativity is implicated in a very considerable range of extant literature that examines different qualitative aspects of human 'being', action and interaction in the phenomenological life-world, which many consider fundamental to all forms of education. Through this research, it is asserted that by conscientiously focusing on the shared nature of lived experience, and attending to the issue of embodiment for both teacher and learner, it is possible to better appreciate how creativity operates holistically in the day-to-day conduct of human life and learning.

Furthermore, creativity in design is seen to involve intentional and intuitive engagement with a wide range of theoretical, contextual and experiential as well as instrumental design knowledge, skills and attitudes. In particular, it is argued that socially conditioned and situated attitudes, priorities and practices are paramount in activating and contextualising the flow of creativity that shapes and sustains the professional output of the designer. For the professional designer, creativity is stock-in-trade that must be available on demand. It is also suggested that reliable pedagogical activation of creativity in design education can only really occur within specific learning scaffolds, and professional design-related practices. Here the power of creativity has long been tacitly understood and recognised to operate in the studio context amongst practitioners as a catalyst for successfully exploring and navigating new opportunities, constructing alternative possibilities and managing change in discipline specific design applications.

The literature contains ample evidence indicating that creativity is a common yet extremely complex phenomenon, the concept for which has assiduously frustrated repeated attempts at academic definition. This is because many of the typical features of human creativity are highly fluid and adaptive, and are therefore not reducible to simplistic or mechanistic categorisation in terms of product, process, behaviour, personality or environment for example. In practice, human creativity demonstrates a chameleon-like capacity to accommodate differing contingencies that govern domain specific performance and outcomes. This can be seen to operate quite overtly within different manifestations of creativity across an extraordinarily wide range of innovative activities. In terms of academic theory and professional practice creativity is implicated

not only in discussions of art, design, music, dance and theatre for example, it also features prominently in commentaries on architecture, engineering, scientific discovery and technological invention. Similarly, references to creativity can also be found in relation to politics and economics, business and management, mathematics, medicine and the life sciences to name just some amongst many possible fields of creative application. In fact the rapidly escalating pace of technological change and the expanding scope of innovative global networks in the Western world has led Florida and others to note the rise and flight of 'the creative class' and dub the twenty first century the 'creative age' (Florida 2001, 2002 & 2005; and Florida & Tinagli, 2004).

In terms of human psychology, Gardner (1982) somewhat ruefully reflects on the findings of very extensive and painstaking empirical research undertaken on creative people of some renown by psychologist Howard Gruber (Gruber 1978; Gruber & Barrett, 1980) and psychoanalyst Erik Erikson (Erikson 1950; Erikson, 1959) among others. From this research Gardner (1982, pp. 352-357) highlights many recurring whole-person creative attributes that are difficult to account for within the traditional tenets of cognitive psychology alone. These include the marked curiosity and persistence of energetic, fully engaged, committed and well disciplined people who conscientiously 'juggle' multiple images, questions, dreams, sketches, networks and schema of different types, written comments, arguments and notes to themselves. The resulting jumble of clues or conceptual signposts is likened to incipient 'cognitive maps'. These are said to involve various 'interacting subsystems' of iterative categorisation, analysis and synthesis that are constantly subjected to rigorous and self-conscious organisation and reorganisation. Gardner finds most notable the recurrence of 'dominant metaphors', evocative themes or images where '… often the key to the individual's most important innovations inhere in these images', such as Darwin's evolutionary 'tree' (Gruber, 1978). Some 'guiding purpose' or 'goal-directedness' influences the take up and mastering of selected skills until these become 'second nature', as part of '… a total system (that) stems from the creator's affective life'. Commenting on motivation, Gardner speaks of the strength of creative experiences in terms of a 'special intimacy', 'love' and 'pleasure' in creative work, which is likened to the emotional gratification attending sexual relations or passion. Coincidentally, creative striving is also likened here to a potentially painful struggle or

the loneliness of a '… solitary voyage … where the chances of failure are high', requiring a 'risky tack' that demands courage and a 'strong constitution' to '… go it alone in creative matters'. Finally Gardner characterises such creative individuals as 'heroes' whose worlds feature 'numerous highly interconnected activities' with intense societal and cultural concerns that focus equally on the finding and solving of personally meaningful problems.

In many cases this sort of creative human involvement, in one or other field of expertise, evinces reflective, iterative, interactive, social and cultural experiences that are valued, cultivated and shared within a community of like-minded people. Therefore the processes by which the creative outcomes are achieved in any particular domain should, at least in theory, be both observable and repeatable. Likewise the creative strategies employed might be reasonably considered potentially teachable in relation to practice, provided the key motivational impetus and especially the enabling attitudes, values and beliefs are satisfactorily articulated. However, until quite recently this qualitative aspect of creativity has been marginalised or discounted due to persistent Cartesian preoccupation that privileges the purely intellectual dimensions of creative 'thinking'. When understood affectively, in terms of emotion, engagement and embodiment, more of the underpinning drives of creative activity can be investigated, made explicit and thereby afforded pedagogical priority. Such an approach, as adopted in this investigation into creativity as a higher order capability, potentially renders creativity more meaningful and accessible to the design educator and more qualitatively actionable by his or her students. However, the question remains as to how this can be shown to occur in practice in design education.

To help advance the research problematic a conceptual interpretation of 'how' creativity can be shown to function in design education is encapsulated in an 'Operational Model of Creative Questioning'. This heuristic device is first introduced in terms of research design in Chapter 2, presented in Figure 2:2 (and again in Figure 7:1). It must be noted that the conceptual modelling is only indicative. It is intended as a reference guide for teachers seeking to problematise design content in a creative manner. The 'Operational Model of Creative Questioning' is not meant to be definitive, since there can be no one approach or 'correct' answer to such open-ended hypothetical questions as *'What if?'* and *'Why not?'*.

Instead the operational modelling of creative questioning provides a template for making visible double-loop pathways for generating many plausible and indeed implausible answers to design queries. The model distils, in convenient graphic format, some widely shared prompts used selectively by designers and design educators to arouse perplexity, stimulate curiosity and focus imagination for themselves and others.

The pre-emptive development of this model at the outset of this inquiry is discussed in terms of methodology in Chapter 2 and is further extrapolated in relation to design education in Chapter 7. The 'Operational Model of Creative Questioning' provides a sample of qualitatively oriented working, teaching and learning strategies, rather than concentrating on the specificity of particular behaviours, procedures, instrumental exercises, tasks, techniques or products that some formal or informal theorists have implied will guarantee intrinsically creative outcomes if implemented. Instead the model demonstrates various iterative approaches or enacted strategies, similar to those noted by Gardner, that are routinely employed and adapted by design practitioners to open up new possibilities for critical creative scrutiny. Such strategies demonstrate how intentionally ambiguous, ambivalent, or even aggressively open-ended rhetorical questioning techniques can be applied by practitioners, teachers and students to challenge assumptions, excite interest and consciously provoke potentially creative responses to situations that arise in the studio, workshop, classroom, workplace or at home.

The goal of creativity, as indicated in this model, eschews reliance on single answer solutions or predictable certainties, opting instead in favour of active imagination that problematises content and seeks out different, alternative, multiple, future-oriented 'possibilities' or 'potentialities'. These options are then subjected to rounds of comparative analysis, disciplined critique, critical review, cycles of testing and practical judgement as part of an ongoing process of refinement and 'in-use' design implementation. Such a pedagogical approach privileges multiplicity, ambiguity and 'managed uncertainty'. It readily tolerates interim difficulty and dead-ends, even accepting 'failure' at the concrete and conceptual levels, as providing fruitful triggers for individual and collective reflection and revision informed by ever-increasing experience with both problem finding and problem solving amongst students. The model targets and

relies upon teachers confidently encouraging different sorts of explorative, discovery-related attitudes, motivations and actions. These are seen as stimulating and rewarding life experiences awaiting both teachers and learners that may be applied at will to any design task and many other areas of learning. The pedagogical challenge is to work with and constructively manage the fear of failure in students until they individually develop sufficient courage and confidence to tackle design challenges independently.

Skirting broader metaphysical discussion of Aesthetics, and the related issue of artistic self-expression as an esoteric end in itself, this research into 'Creativity: A Higher Order Capability' selectively investigates creative practices and applied theory pertinent to design. In the process it draws together the acute insights of certain philosophers with intersecting interests in the life-world and the nature of embodied experiences. Particular attention is drawn to various phenomenological perspectives featured in the works of Martin Heidegger (1889-1976), Maurice Merleau-Ponty (1908-1961) and Alfred Schutz (1899-1959). These philosophical underpinnings are then correlated with selected educational theories from Lev Semenovich Vygotsky (1896-1934), John Dewey (1882-1953), Donald Schon (1931-1997) and Etienne Wenger among others, discussed in the context of design education. The contribution of these authors links the emergent philosophical views of the late nineteenth century to an expansive theoretical evolution throughout the twentieth century, which informs the postmodern complexity of the twenty-first century with respect to this discussion of creativity.

Over this same historical period design practice progressively emerged as a specific, self-aware and self-directed field of creative endeavour. This is discussed as Design Context in Chapter 4. While remaining closely aligned with many traditional concerns of art, design practice came to the fore in the early to mid twentieth century as a clearly distinguishable and separate professional discipline. In response to expanding post World War 1 industrialisation and the rapid rise of the consumer society, design quickly evolved multiple specialisations and discipline-specific frames of reference. Self-defining design specialities include interior design, fashion design, graphic design and industrial design for example, in addition to other more broadly based disciplines such as architecture, engineering and digital media to name but a few professions where creative design in a

commercial context is a central consideration. Design education however took somewhat longer to separate itself from long established pedagogical traditions, assumptions and priorities dominating institutionalised art education. The challenge for design educators has long been to differentiate, articulate and assert an alternative pedagogical platform that successfully marries creative and social aspirations with an acknowledgment of client prerogatives and the governing functional, industrial and commercial criteria that underpin professional design practice.

Design history, theory and research self consciously emerged as relatively new fields of academic pursuit in the late twentieth century seeking to identify, address and elevate the needs, concerns and values of designers by acknowledging specialised educational interests and priorities. Considerable academic effort in design education has gone into identifying pertinent theoretical frameworks to assist local and international communities of practising designers and design educators to meaningfully engage, exchange and expand the scope of dialogue in order to overtly elevate the academic status of design knowledge (Margolin 1989, pp.265-287). This conscientious striving toward academic recognition of design, as a profession 'distinct from science and the humanities', was initiated by the Design Research Society with the 1979 launch of the international *Design Studies* journal. The declared aim of this publication was, '… to establish the theoretical bases for treating Design as a coherent discipline of study in its own right' (Gregory 1979, p.17). Other journals and publications focusing on design history, design issues and design research soon followed the lead of this scholarly journal, fuelling the discourse on design to the present day in print and online. The flurry of textual activity was complemented by the rise of design industry associations and professional networking around the world and a commensurate growth in the frequency and rigour of professional design conferences. This gave impetus to collaborative projects, joint research, student exchange and visiting scholar programs and the sharing of design activities and information by any and all available means of communication.

Design education in Australia grew out of Western art and design education traditions, philosophies and aspirations. This Design Education heritage is discussed in Chapter 4. A brief overview of the structure of design education in Australia is also included for

reference as Appendix 2 to help differentiate educational sectors and qualification levels designated in the mandatory Australian Qualification Framework (AQF). Appendix 2 provides an 'Iterative Model of Professional Design Education' (Figure A2:1) indicating relative priorities in different sectors afforded to the divergent competencies that contribute to creative capability. By looking at design knowledge as 'context', 'concepts' and 'cognitive strategies'; and identifying design skills with practical 'processes', 'abilities' and 'technical applications', it is possible to locate overarching values and influential design 'attitudes' that help draw the constituent parts together into a more holistic re-conceptualisation of creativity. These attitudes and shared aspirations are discussed in Chapters 5 and 6 in terms of holistic and embodied deep learning, innovative capacity and most importantly higher order creative capability.

The attitudinal component of design encompasses crucially important enacted values, beliefs, motivation, confidence and a willingness to engage and participate in creatively oriented activities. Creative attitudes represent the operational 'glue' that binds propositional and experiential design knowledge together with practical judgement and technical design skill in meaningful ways. As such creative attitudes involve much more than just creative 'thinking' processes. Creative attitudes are of a higher order, precisely because they require the exercise and application of fully embodied interpretive capabilities, which enable and indeed empower learners to actively 'be creative' in a wide range of circumstances. Hence, cultivating creative attitudes is an essential aspect of meaningful design education. This is discussed in Chapters 6 and 7 in relation Targeting Creativity in Design Education referring to precedents, priorities, current practices, key issues and specific theoretical frameworks. This includes notions of 'performativity', different socially constructed bodies of knowledge, identity formation and 'situatedness' embedded within the theories of reflective practice (Schon, 1987) and communities of practice (Wenger, 1998) for example. These theories are examined in relation to critiques by other commentators. The present research therefore involves a reflexive meta-analysis of assumptions about creativity that underpin past and present design propositions and educational practices. A cursory overview of the broad conceptual thrust of the research follows, noting certain key philosophies and educational constructs that provide insight

into the importance of understanding creativity in terms of holistic embodiment in teaching and learning. As John Dewey (1934) observes:

> In common conception, the work of art (or design) is often identified with the building, book, painting or statue … isolated from the human condition under which it was brought into being and from the human consequences it engenders in actual life-experience … When … separated from both conditions of origin and operation in experience, a wall is built around them that renders almost opaque their general significance … Art (and design are) remitted to a separate realm, … cut off from the materials and aims of every other form of human effort … A primary task is thus imposed upon one who undertakes to write … to restore continuity between the … intensified forms of experience that are works of art (or design) and the everyday events, doings, and sufferings … recognised to constitute experience. (Dewey 1934, p. 3)

In this context it is perhaps worth declaring that the impetus for writing about creativity as a higher order capability is inexorably linked to a desire to make an informed pedagogical contribution on the topic. Potentially, the research and interpretations presented here may prove useful in enhancing ongoing design and design education practice. For the author, creativity is a rich and familiar wellspring of rewarding experiences that represent the core values, key sustaining motivation and ultimate justification for continued participation in professional design education practice and research.

In their report *Strategic Review of Research in Education*, McGaw, Boud, Poole, Warry and McKenzie (1992) refer to Anderson's four key sources of research questions - namely intellectual curiosity; hypotheses arising from theory; personal concern about particular educational problems; and requests from policy agencies. In part this inquiry arises from a personal concern with making explicit many persistently implicit (mis)conceptions about creativity, which fuel a certain reticence that inhibits serious pedagogical attention being afforded to creativity as a primary outcome in the teaching and learning of design. Hence this investigation may be said to reflect the view that, '… since education is fundamentally a domain of action, educational research must not only develop richer understandings of actions but also inform actions' (McGaw et al. p. 55). Furthermore, this examination of the deeper implications of creativity stems from intellectual curiosity in identifying new types of information and new insights drawn from many different sources. The correlation of this information and its interpretation promises to fill in some of the gaps by providing a more complete expose and a deeper appreciation

of what contributes to making creativity a higher order human capability. Therefore this study is perhaps most consistent with the view of McGaw et al. that, '... there is a place for both curiosity-driven and action-oriented research'.

Hence, this inquiry aims to balance purely theoretical research into the nature and locus of creativity with the relevance and practical application of this research in design education. It is hoped that the Operational Model of Creative Questioning mentioned previously might prove useful in assisting design educators to overtly target creativity in design teaching and provide a heuristic guide pertinent to future teacher education in design. Potentially this study may also prove useful in informing reviews of design curricula across secondary, vocational and higher education sectors relevant to the Iterative Model of Design Education (Appendix 2). The topic of Creativity: A Higher Order Capability is therefore approached in an interpretive manner from the dual perspectives of design as a professional discipline and adult education.

Research problematic: *How is creativity made teachable in design education?*

Whilst the practice of design and design education, as interrelated specialist fields, grew in prominence, reputation, scope and professionalism over the latter half of the twentieth century, the core components of creativity tended to be dealt with more as a technique or implicit by-product of design knowledge and practices. Over the same period, creativity has been the subject of recurrent waves of investigation in different contexts such as cognitive psychology, the neurosciences, management and professional self-development or populist self-actualisation contexts for example. Past attempts have been made to pin down creativity by applying scientific methodologies including for example psychometric testing and measurement (Torrance & Torrance, 1973). In a piecemeal manner these earlier investigations advanced academic discussion and served to heighten fascination with creativity as a generalised human attribute that continues to confound explicit definition and scientific prescription.

Nevertheless, creativity has long been accepted as an important foundation for the design disciplines. Based on shared beliefs and assumptions, creativity is often tacitly understood and treated as an underpinning contextual issue, rather than featuring as a core component of design learning. With some notable exceptions course structure, curriculum

development and accreditation, teacher training and classroom delivery in design and design related fields tends to presuppose creativity, pay it lip service or just take it for granted, largely due to its persistent theoretical indeterminacy. It is not surprising then that creativity remains largely unexamined by many teachers, learners, industry practitioners and the general public. Consequently, creativity retains a certain mystique. Some sectors of the community still consider creativity to be a positive aberration predicated on some happy accident of birth or familial circumstance that accounts for the innate 'talent' of exceptionally 'gifted' individuals.

This is especially so where design education is, in Dewey's words ' … remitted to a separate realm', marginalised by a preoccupation with cognitive or more concrete procedural skills development. With the routine repetition of many traditional classroom exercises in design education, students are often encouraged to mimic typical design behaviours with little or no explanation of what the learner is creatively being asked to do or why. Associated with this is an over emphasis on the delivery of content directed toward achieving measurable outcomes. This competency or outcomes based approach to design teaching neglects the processes by which people can learn to 'be creative'. Such teaching and learning may diligently adhere to a design or technology syllabus, whilst neglecting the issue of 'meaning making'. This results in satisfactory projects being generated by teacher-dependent students, where deeper understanding and the autonomous application of creativity are merely incidental or implied. Under such conditions, the nurturing of creativity as a pedagogical goal is neglected. Thus creativity is perceived as a peripheral, mysterious and indeterminable 'talent' possessed by some learners and not others. Ultimately this situation restricts and compromises educational opportunity thwarting potential development of creative autonomy in learners. Discussing such matters Potter (1980) argues that:

> A design capability proceeds from a fusion of skills, knowledge, understanding, and imagination; consolidated by experience. These are heavy words, and they refer to the foundation … It is too much to say that design ability can be 'taught'. As with any creative activity, it is a way of doing things that can be grown into, perhaps – but not necessarily – in the context of a formal education. This view is readily conceded for something as immaterial as 'imagination', but it is commonly held that skills and knowledge must not only be taught, but rigorously examined … The damage caused by knowledge used without understanding is merely difficult to measure: it is not less real for that. A skill may be irrelevant to the nature of a problem, or – in dealing with people – may be grossly uninstructed in a necessary tact and discernment. Knowledge may be thinly experienced as a rag-bag of conventional responses helped along by access to someone else's published working details. Plainly, skill and

knowledge cannot be weighed out … and separated from qualitative perceptions, for any but the simplest mechanical problems – and even there it is questionable. Even 'judgement' … becomes ponderously inhuman unless fertilized by some order of creative spontaneity. (Potter 1980, p. 25)

Unfortunately, some design education delivery is overly task driven and can occur in the absence of clearly articulated pedagogical strategies that encourage and support creativity. This may be because those engaged part time to teach designated design classes are often practitioners drawn directly from industry with high content knowledge and practical skill levels but limited induction into the roles and responsibilities of the teacher in engendering learning in others. Conversely career teachers, especially in secondary schools, may be generically trained educators without any first hand experience of having been required to muster and apply personal creativity on demand in professional design practice in industry. Here the link between pedagogy and application, between theory and practice fails to encompass the insights of the two intersecting communities of practice. Designers and educators, finding themselves ill equipped and at crossed purposes, may play it safe and shy away from overtly targeting creativity in teaching and learning design because it seems too difficult or obscure a criterion to address in program development and delivery, and especially in assessment. In such circumstances it becomes extremely difficult to defend and promote creativity as a core value in the face of escalating government and/or institutional rationalisation spreading across all sectors of education and training. Competency based training for example promotes definitive, often atomistic, approaches to knowledge and skill acquisition at the expense of cultivating the holistic creative attitudes needed to manage uncertainty and engage in calculated risk taking. Similarly, technologically focused outcomes-based education prevalent in schools, vocational and higher education may seek innovation while negating creativity due to narrow implementation of scientific methods of enquiry.

Creativity therefore exists (or not) in a vague and potentially haphazard educational dynamic between individual teachers, students and studio learning environments that are subject to ever increasing threat of compromise. Compared to mass education delivery modes, the merit of exploratory, project driven, practical design activity tends to be weighed unfavourably. This is due to higher delivery costs based on traditionally lower student/teacher ratios in design classes and the need for collaborative development time

spent in a studio environment using specialist equipment. Consequently, educational authorities argue that a more streamlined, efficient and relevant approach should concentrate on specific processes, and product oriented outcomes, that privilege narrow competency development and/or a focus on academic design theory and knowledge, rather than pursuing holistic capability formation in practical design applications. This is generally asserted at the expense of scaffolding fully integrated learning experiences and adaptive learning strategies that model creative practice in a professional design community.

Ironically, this trend to contain and rationalise design education in Australia and elsewhere has coincided with an increasing international demand to boost innovation and improve economic performance and global competitiveness by creatively leveraging conceptual, academic, occupational and technical design opportunities. Widespread structural change is impinging directly on individuals, communities, industries, institutions and governments. In part this is brought on by the introduction of powerful and integrated communication technologies, as well as the introduction of new materials, automated computerised production processes, constantly evolving product applications and the realignment of global markets. Government calls for enhanced creativity through education at a system wide level is apparent in the recent Board of Vocational Education and Training (2005) consultation paper on 'Skills - Building Workforce Capabilities' released to inform development of the NSW Strategic Plan for Vocational Education and Training 2005-2007, arguing under 'Skills for Innovation' that:

> The creation and commercial deployment of new knowledge is considered the key source of comparative advantage for an individual, enterprise, region or state. What people know and can do, their creativity, their ability to change and to innovate is seen as the key to success… What skills are needed to support innovation in the workplace? What is VET's role in developing these skills? (BVET 2005, p. 1-2)

While the need to cultivate creativity through school, vocational and higher education has now become urgent, there is no clear manner in which educators feel confident in 'how' to go about achieving this end. Overt acknowledgement and support for creativity is thwarted at the implementation level by a lack of targeted pedagogical insight into how creativity operates as a complex, multi-dimensional enabling capability. Social, cultural and structural perspectives on education substantiate the need for research into creativity

as a higher order capability as a means of addressing the particular pedagogical question of 'how' creativity can be made teachable as much in design as in other fields of education. In principle, Brockbank and McGill (1998, p. 7), ' … welcome alternative approaches that "open up" process to make the realisation of learning … more feasible…' Furthermore they, ' … assert that prescription about the form that teaching and learning should take, without being transparent about process, is likely to remain prescription. There is a need for a 'how' discourse in which teachers and learners can take on and create their own meaning and practice'.

In this vein Ramsden (1992, pp. 42-43) refers to the work of Marton (1988, p. 66) to articulate where the 'how' discourse intersects with different approaches to learning in terms of structure and meaning. He suggests that holistic deep learning requires a structural approach to educational delivery as, '… the act of experiencing, of organising, of structuring … (that) focuses on the whole in relation to the parts'. Theoretically, Wenger's (1998) social theory of learning is also useful in synthesising and interpreting disparate research information concerning creativity and design education with respect to situated learning. The concept of 'communities of practice' helps identify an educational framework within which creativity may be profitably discussed in terms of ' … learning, meaning and identity'. This study of creativity as a higher order capability involves three interdependent communities of practice, representing the overlapping professional fields of design practice, education practice and the hybrid discipline of design education practice. In particular Wenger asserts that, '… many different kinds of learning theory … reflect a deliberate focus on … the multidimensional problem of learning, and … more fundamental differences in assumptions about the nature of knowledge, knowing and knowers, and consequently about what matters in learning'. Wenger's notions of learning as 'doing', 'experience', 'becoming' and 'belonging' have particular resonance for this investigation of creativity when seeking qualitative answers to the question of 'how' creativity is made teachable in design education.

Postmodern positioning of the inquiry

In employing a hermeneutic approach for this qualitative inquiry into creativity, it is useful to adopt a broadly postmodern discipline to deal with a breadth of literature, much

of which reflects a distinctly modernist frame of reference. Under modernist assumptions creativity has tended to be marginalised or tightly constrained, being considered a rather unamenable topic for serious academic scrutiny within scientific research methodology. The main difficulty stems from the fact that, as a topic of empirical enquiry, creativity belligerently defies succinct definition because it exhibits many and varied affective properties as noted previously. In general, a postmodern perspective provides considerably more scope because it permits in-depth discussion of creativity from a qualitative perspective. Adopting a postmodern orientation admits an eclectic multiplicity of viewpoints on the topic to be canvassed without the expectation that these viewpoints need necessarily be reconciled or subverted within one or other dominant theoretical tradition or reductive definition. In this respect this study is intentionally interdisciplinary.

This qualitative inquiry is therefore not predicated upon scientific research methods. Nor is it primarily concerned with the separate, and quite substantial, bodies of disciplinary knowledge existing in either academic field of design or education. Instead, selected knowledge from design and education provides a contextual background to inform a much more broadly situated pedagogical investigation into the likely nature of creativity as an embodied human capability. As such this research is itself located in the 'extra-disciplinary' or 'trans-disciplinary' territory in between many professional domains, including psychology, philosophy, design and education, in a dimly lit and provisionally contested space where Hodge (1998, pp. 113-128) warns that 'monsters' breed.

Acknowledging Foucault (1976), amongst other postmodern commentators, Hodge refers to trans-disciplinary research as 'monstrous knowledge', which he suggests is increasingly coming to define theoretical directions in the 'New Humanities'. New sources of information and acknowledgement of the relevance of different types of knowledge have begun to emerge that deviate from many traditional research assumptions, empiricist dictates and scientifically predicated methodologies. The 'postmodern turn' has opened up previously inaccessible theoretical territory positioned on the borders between disciplines where postmodern research issues of incredulity, reflexivity and textuality come into play. The conduct and outcomes of any research in the social sciences, including this research on creativity and design education, invite self-

conscious acknowledgement of postmodern interest in the coalescence of ideas in unconventional frames of reference, informed by alternate viewpoints and multiple voices discussing matters hitherto considered 'unspeakable' (Smith, 1998). Armed with an acute scepticism toward undeclared bias and misplaced assertions of 'truth', researchers are now able to look beyond established disciplinary borders, free from the narrow prescriptions and self-limiting constraints of a positivist worldview.

Indeed, it can be argued that this research into creativity simply would not have been feasible except for the advent of postmodernism and the associated theoretical rebuttal of modernist assumptions about what does and does not constitute a valid academic research topic. Arguing from the positivist perspective of scientific method, Kerlinger (1986, pp. 20-26) for example specifically cites creativity as an 'interesting and important' but non-scientific problem. Furthermore he asserts that as an academic research topic, creativity is potentially invalid because it lacks 'definition' and therefore fails in terms of its 'testability', in that it presents metaphysical questions involving 'self actualisation of the individual' that are deemed 'too general and too vague' to have 'adequate empirical referents'. This raises the issue of exactly what methodology may be appropriate for researching creativity as a higher order capability in a postmodern context?

Various authors, including Usher, Bryant and Johnston (1997) and Hodge (1998), have critiqued technical rationality in an effort to analyse the shifting methodological implications for research that adopts a postmodern 'mood' or 'attitude' or 'orientation'. Accepting that postmodernism is not an alternate research paradigm, the qualitative research method most suited to investigating the nature of human creativity favours an interpretive approach. Always remembering, however, the postmodern caveat against false certitude, there is a need wherever possible to foreground 'pre-understandings' and avoid the modernist tendency to default to simplistic binary oppositions when trying to analyse different points of view.

Unfortunately, binary oppositions are rife within discussions of creativity, most particularly with respect to the Cartesian privileging of mind over body and the preoccupation with 'creative thinking' noted earlier. Adopting a hermeneutic approach affords increased tolerance of ambiguity and acceptance of a plurality of possible

meanings attributable to social phenomena and practices without necessarily looking to impose teleological or totalising explanations. As such, an interpretive strategy can remain contingent and makes provision for an 'open minded' and intentionally open ended discussion of the nature of creativity. This orientation is especially useful in that this project is informed by certain phenomenological sensitivities. Such sensitivities probe deeply into the qualitative dimensions of human values and emotions that give rise to individual subjectivity and collective intersubjectivity, which may be seen as indispensable in attitude formation and motivational development in learning to be creative.

Hence, the present research into creativity as a higher order human capability adopts a broadly interpretive approach that first situates the discussion in terms of design context and design education. Past efforts to understand creativity, in definitive and purely instrumental scientific terms, especially that offered by empirical psychology, are examined and to a certain extent eschewed, though not entirely discounted. The investigation then turns to philosophy as a means of exploring the realm of underpinning values, beliefs and emotional constructs that seem to motivate people to 'be creative' in a conscientiously active and fully embodied participation in the life world. Here, recent neurological evidence offers some remarkable insight into how human beings assimilate and holistically process a wide range of creative stimuli at the physiological, psychological, philosophical, perceptual and cognitive levels. This interpretive approach helps in drawing together information from many disciplinary fields where theorists now acknowledge that possibly the only way forward is to try correlating different covalent views about the possible nature of creativity as a multi-dimensional and therefore very complex qualitative phenomenon.

Significant in all the speculation about creativity emerging from different perspectives over more than a century is the incontrovertible realisation that creativity is a very human and highly adaptive attribute that is not fixed nor readily objectified. As such it is most important to acknowledge that creativity is not just an isolated individualistic phenomena but rather a dynamic force that operates socially and culturally in the world. In addition to individual creative potential or capability, creativity as a shared human attribute

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influences the affairs of whole communities, as these intersect and overlap in daily life. Over time, human creativity serves to overtly shape destiny and re-shape whole environments and societies through the evolution and exchange of abstract ideas, values and beliefs, as much as in the transmission of practical techniques and the development of innovative technologies, or the trade in tangible goods, services and information. Education is but one of the means by which people share different interpretations, exchange new knowledge and explore creative understandings of the world. Creativity operates both inside and outside formal institutional settings as a critical survival strategy by which people grow to full maturity, assert their independence, fulfil their potential and mutually negotiate, manage and affect ongoing social, cultural, technological and environment change. In this respect creativity is a dynamic cultural mechanism that supports human life and learning in an uncertain world.

Observing the tenets of postmodernism therefore seems particularly relevant to this discussion of creativity in that it requires the foregrounding of ontological considerations over epistemological concerns (Usher 1996, 9-32). Accepting a postmodern orientation allows congruent and even contradictory views about the nature of creativity to be presented without the need to prioritise or homogenise such information into a singularly verifiable explanation of 'what' creativity is or is not. To some extent this alleviates an onerous definitional preoccupation inherent in traditional research assumptions. A postmodern research perspective also alleviates the impossible demand to determine precisely 'where' creativity is thought to reside within the psyche of individuals or indeed 'where' it might be most reliably located in time and place amid the various theatres of human activity.

Therefore, the ontological focus of this research is on questioning what it means for humans beings to experience creativity, to holistically feel and be creative in a fully embodied sense with heart, hands and head and then to examine how they and other people may interpret and value creativity differently. This involves trying to understand 'how' creativity is thought to operate at both the personal and interpersonal levels so that it might be more readily recognised, facilitated and stimulated in both formal and informal teaching and learning contexts. This is not an instrumental approach that focuses

on creative tasks or procedures or skill-based techniques or teaching methods, although some reference is made to such considerations when reviewing certain pre-existing characterisations of creativity.

Before proceeding in the spirit of postmodernism with a theoretical exploration into the nature of creativity as a research topic it is necessary to first reflect upon the motivation driving this academic investigation. Such a 'confessional' statement attempts to reflexively situate the resulting research by taking 'a critical stance toward the practice of sense-making and sense-taking' that is inevitably inscribed in the dissertation (Usher 1996, p. 31).

In a metaphorical sense this research text may be considered an intellectual travelogue. A story of a professional journey of rediscovery, similar to a treasure hunt, looking into past experiences of creativity in search of missing pieces of the puzzle. Reflectively, it documents a process of verification or self-validation for the researcher. After more than thirty years working in the field of visual art and design education, culminating in responsibility for setting strategic directions and writing curricula, the following academic research offers a timely opportunity to cast a critical eye back over a meandering career path. This particular career path spans the latter half of the twentieth century and the turn of the twenty-first century. As such it parallels the most expansive phase of art and design education in Australia. It follows a professional career launched in the 1970s and shared with many other committed art and design practitioners and educators of the same generation who still tend to value creativity above all other pedagogical criteria as a professional *raison d'être*.

Therefore the goal of this study is to reflect upon a personal trajectory to expose past assumptions, identify personal pre-understandings and reconsider many tacit beliefs about creativity and its relevance in teaching and learning design. By taking account of a much older philosophical heritage and mapping previously unnoticed conceptual and theoretical milestones the aim of this study is to source the derivation and check the cogency of some of the strongest held convictions about the nature of creativity as a human capability. The extent to which these convictions are indeed shared by others is confirmed using a questionnaire circulated among members of the Design Institute of Australia (DIA) and

their associates in design practice and design education. Survey data are reported in detail in Appendix 1 with the findings and implications discussed in relation to Research Design in Chapter 2. Together this research approach provides a platform for seeking out further evidence from different sources to better inform current and future creative practice.

In this context design education represents an explicit destination and a very particular frame of reference that must be differentiated from art, craft and science. In design, belief and confidence in creativity is an article of faith, an inspirational catalyst and a practical fulcrum point upon which professional decision making and pedagogical practice depends not only for this researcher but also potentially for many other design educators as learners, as teachers and as creative practitioners.

Like all good travel stories, and notwithstanding a strong sense of *deja vu*, the journey into the trans-disciplinary unknown looking for information about creativity requires research in previously unfamiliar academic regions, especially when traversing the life sciences and the history of philosophy. In many instances the specificity of 'languaging' and the unfamiliarity of very different methodological traditions poses significant challenges for interpretation. Meaningful translation between domains of knowledge requires a concerted effort to build bridges of understanding in order to ensure some reasonable coherence in the resulting discussion of the issues. As a result the picture of creativity unfolds progressively in the following chapters. At every staging post the narrative remains provisional in its relation to the differing bodies of pre-existing disciplinary knowledge.

The various descriptions of and discussions about the likely nature of creativity presented within this dissertation always remain contingent and variable akin to photographic impressions taken out of the window of a moving train. Like the passing view outside the train window science, philosophy, education and design are never static, they have very different histories and they occupy very different spaces and places in the educational landscape. In many cases the sites of established disciplinary knowledge about creativity are separated by picturesque chasms filled with a fecund and enticing wilderness where new knowledge lurks and where 'monsters' are said to prowl (Foucault 1976, p. 224). In both familiar and unfamiliar research territory remnant Cartesianism hovers ever ready to

ensnare and confound the unwary pilgrim with an extraordinarily persistent theoretical segregation of selected intellectual matters from the overall corporeal experience of creativity in design and in teaching and learning. Nevertheless it soon becomes clear that, despite the cognitive privileging of 'creative thinking' as a purely intellectual and supposedly objectifiable construct, there are a great many other equally important dimensions to creativity that must be explored if creativity is to be understood as a fully embodied and enacted human capability.

While a level of cautious postmodern awareness has been brought to bear in writing up the research, this dissertation has not been written, nor is it intended that it should be read, as either a 'postmodern text' or a 'phenomenological text'. The discussion of creativity as a higher order capability is largely 'silent' about criteria used to select or omit references that inform the ultimate textual configuration of the written work. It is also silent about potentially different 'readings' of creativity that might have been considered in respect of gender, race, class relations or nationality for example because these hermeneutics fall outside the stated research problematic and the textual scope of the dissertation.

Given that this study seeks to outline a broadly relevant educational perspective on creativity, across institutional design education in Australia, it is not intended nor thought to overtly include or exclude, privilege or disadvantage, particular individuals, cohorts, age groups, cultural or minority groups within the design education constituency. It is acknowledged, however, that outside of institutionalised design education applications, creativity also has relevance for many other sectors in the arts, in education and in different communities. Not all potentially interested parties focus on design specific issues. Therefore some readers may consider this research limited in its primary focus on visual modes of creative communication, with little or no attention having been afforded to different creative priorities in other equally valid sensate disciplines such as music, dance, theatre or literary pursuits for example.

The 'authority' of the researcher at times recedes in relation to inclusion and correlation of literary references authored by a wide variety of other writers whose independent voices are intentionally preserved in selected quotes to demonstrate the provenance and vehemence of particular views. This choice reflects a desire to 'listen' rather than

dominate the discussion and 'speak over' the long forgotten whispers that continue to impinge upon implicit and at times quite inappropriate assumptions and partial understandings of what creativity is and is not thought to involve. Multiple quotations are used intentionally when it is considered important to draw attention to the range and dissonance of many contested commentaries that seek to define both design and creativity, without necessarily satisfactorily achieving this end. Similarly, quotations are also used to demonstrate a confluence of theoretical views from disparate sources or when presenting potentially challenging ontological arguments from philosophers such as Heidegger and Merleau-Ponty whose struggles to articulate ephemeral or abstract aspects of what it means to 'be creative' at an experiential level warrant respect. In such instances paraphrasing seems inappropriate or ineffectual because it homogenises and threatens to impoverish the text, thus robbing the discussion of a potentially rewarding richness of meaning and depth of situated interpretation.

Issues of relative power are discussed in the following chapters particularly in relation to theoretical awareness, educational settings and the nature of creative relationships and levels of interaction established between teachers and learners in classroom and studio settings. Power is also discussed with respect to three intersecting communities of practice involving designers, educators and design educators, acknowledging criticism where theorists may fail to declare their own presuppositions within the theories they espouse or neglect to exercise self reflection when discussing reflective practice for example. The exercise of power in different arrangements within which creative professionals may work is noted including workplaces, schools, vocational and higher education institutions. The relative lack of power of students and practitioners over pedagogy is pertinent to the ongoing evolution of design education within tiered bureaucracies where differing patterns of design and education practice have emerged at school, vocational and higher education levels in Australia, England and the United States of America. Finally, political, economic and regulatory drives to boost innovation, productivity and national prosperity through educational initiatives represent the dominant exercise of government power over State and regional education authorities, sector interests, institutions, teachers and students. This is most apparent where educational policy and curriculum development are centralised leaving minimal

opportunity for the participants in education and training to make decisions over the nature of the design teaching and learning made available in terms of competency or holistic higher order capability development.

Matters of textuality, authority, relative power and influence are weighty concerns. Unfortunately in-depth analysis of these aspects of the inquiry falls outside the scope of this dissertation. These matters are therefore integrated into the discussion of other content or mentioned in passing as context for various design, education or design education considerations. Beyond these cursory references it is hoped that the provision of a breadth of pedagogically oriented information about creativity as a higher order capability will potentially empower both experienced and novice design teachers who may access this research. In this respect, it may be possible in future that this study serves to inform further discussion and research on how the findings presented in the following chapters can be usefully critiqued, extrapolated and applied in various educational settings. In particular, this inquiry could be used to expand pedagogical awareness of creativity in initial teacher education in design and technology and professional development programs as noted in Chapter 8.

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Chapter 2:

<u>RESEARCH DESIGN</u>

Hermeneutic epistemology provides for a potentially complex but open-ended account of various forms of meaning attached to social practices such as the practices of design and education. According to Carr and Kemmis (1997, p. 83), '… the 'interpretive' tradition of social enquiry … seeks to replace the scientific notions of explanation, prediction and control, with the interpretive notions of understanding, meaning and action'.

Creativity: A Higher Order Capability is a reflexive study. A qualitative methodology broadly informed by social phenomenology is used to investigate and systematically reinterpret the likely nature of creativity in a more holistic way than is generally the case. Three primary avenues of information have been triangulated to help identify points of theoretical coalescence across a wide range of literature. These apparent coalescences are analysed in relation to design and education then synthesised into a pedagogically oriented examination of fully embodied creativity commensurate with the assertion that creativity is a higher order human capability relevant to design education. In the process creativity is shown to operate holistically not only at the individual and collective levels but also at a much wider and more socially influential level as a cultural 'meme'. This is discussed in detail in Chapter 5. Within the broadly postmodern perspective noted previously, the main pragmatic reference point for this research looks specifically at 'how' such a revised understanding of creativity might relate to the priorities and practices of design education at secondary, vocational and higher education levels.

Methodology

Three sources of triangulated research information are investigated. Firstly information is derived from an historical review of background context. This looks at concepts of design and design education practices as this intersects with concurrently evolving theories of creativity throughout the twentieth century. Secondly, this contextual understanding is juxtaposed against selected philosophical analyses of creativity taken from within

differing phenomenological traditions to examine 'praxis and action' in association with the qualities of 'being', sensate physical 'embodiment' and 'meaning making' predicated upon social interaction. The third aspect of the inquiry focuses on relevant educational theory related to the scaffolding of learning, the principles of reflective practice and the situatedness of design education in relation to notions of professional identity formation and 'communities of practice'. The specificity of designers' views about the nature and importance of creativity for design education is substantiated at the outset in findings of a national survey of practitioner views, discussed in this chapter and fully reported in Appendix 1.

The triangulated interpretive research methodology used in developing this thesis is indicated in the following Figure 2.1. This describes an iterative research process moving through successive layers of investigation, interpretation and analysis. The postmodern perspective noted previously provides a contemporary analytical platform from which to reflect upon the interplay between historical context, philosophical analysis and pedagogical synthesis.

Figure 2:1 Triangulated interpretive research methodology.
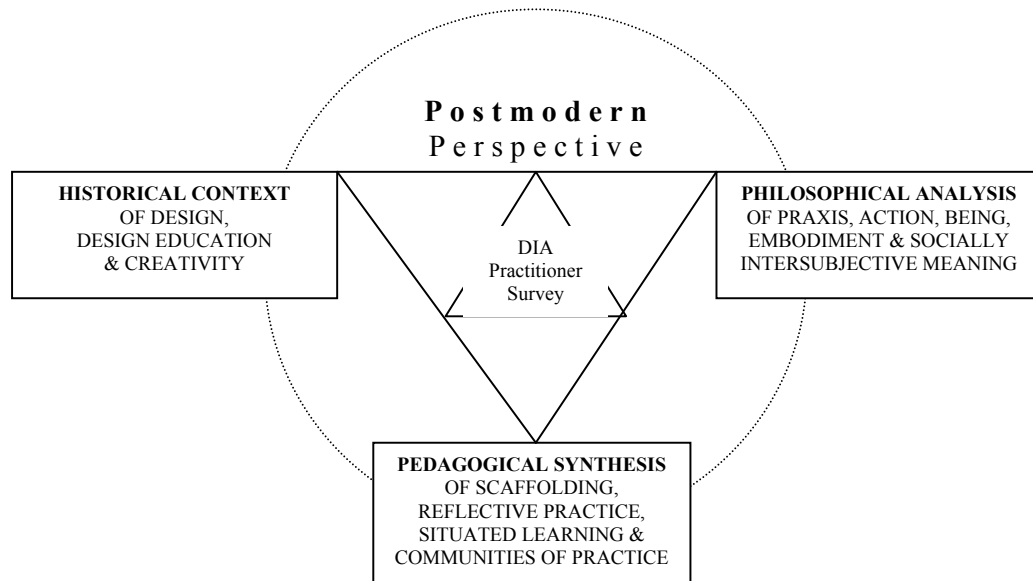
The practitioner survey into key aspects of creativity for teaching and learning in design education is an important touchstone that anchors the investigation in the present. The survey verifies the extent to which creativity is tacitly understood by the design profession, but is nevertheless considered an 'essential' element of design teaching and learning within the overlapping communities of designers and design educators in Australia. This defines a gap between implicit professional views on creativity and explicit industry expectation that creativity should be an identified outcome of design education. This pedagogical gap in professional engagement with creativity as a higher order capability sets the conceptual parameters of the research problematic investigating 'how' creativity is made teachable in design education. Such a methodology has proved challenging but necessary in arguing that, as a higher order human capability, creativity represents a plethora of holistic, socially situated and constructed practices. Creativity is not a singular phenomenon or technique with fixed conditions and components. Rather creativity remains contingent. It is a way of dealing with the world that is experientially focussed and highly adaptive. Thus creativity is best understood affectively as a human attribute, which is fully embodied, psychologically expansive, physically enacted and intellectually engaged, rather than merely a particular form of cognitive information processing or 'thinking'.

Creativity is highly valued by those with an interest in design and innovation. The exercise of creativity in design education calls for the stimulation of alternate approaches and new initiatives that result in the promotion of differentiated identities. Such creative identities heighten human performance and responsiveness within particular, mostly applied, situations. As a form of performative social practice, creativity therefore involves people acting autonomously and collectively within a cultural context to acknowledge and foster 'difference' as a means of intentionally formulating meaningful identities for themselves and others within and outside of specific communities of practice in design, education and design education.

In design related activities, commitment to acting creatively assists in identifying and solving both conceptual and practical problems. Creativity helps to generate new ideas and inspire efforts to develop diverse innovations and applications of both old and knew

knowledge. Creativity enables people to overtly negotiate (rather than passively react to) the ambiguities, challenges and unanticipated opportunities presented by all manner of change. As such, creativity is shown to operate at the personal as well as interpersonal levels. This is a point of some contention within the literature, often dubbed 'small c' creativity at the everyday level and large or 'big C' creativity at the community level. Such a designation tends to impute a negative value judgement onto modest individual creative achievement as inherently less meritorious than highly acclaimed and more widely adopted discoveries or inventions.

Critical views on the relative importance or social significance of creativity, especially in education, therefore waver in response to long running debates over the private versus public distinction of creative people, processes or products. Creative merit is often assessed according to the relative scope, scale and longevity of its social or cultural impact. At issue here is the intelligibility and attribution of various orders of meaning to creativity. This arouses curiosity and sustains an abiding interest in interpreting and coming to understand past, present and future implications of creativity as a human attribute thought capable of enriching life and potentially shaping human affairs for the better into the future.

When creative action or creative momentum survive and multiply beyond a specific discipline, event, person, place or time then it can qualify as a powerfully influential cultural force or 'meme'. This notion is examined in detail in Chapter 5. When considered as a 'meme' creativity shows a potential to significantly alter interactive human behaviour over time in a myriad of ways across different communities, cultures, disciplinary applications, geographic locations and socio-economic sectors. At the global level in Western market economies for example, creativity in design is well known to overtly differentiate image, identity, fashion, style, taste, consumer behaviour and lifestyle choices. This is highly significant in terms of adult learning, constituting what Usher (1997, pp. 5-18) refers to as the 'aestheticisation of life'. In particular, this aspect of creativity invokes the postmodern 'culture of consumption', which is not so much about sameness, and the mass manufacture and marketing of goods and services, but rather

draws attention to the functioning of individual choice and 'desire' in the consumption of 'difference'.

At national and international levels creativity underpins the balance of trade via shifting technological developments, changing manufacturing priorities and production trends, increased industrial performance and expanding information exchange. Enhancing creativity and innovation is commonly associated with the promise of boosting financial prosperity in knowledge-based market economies. Equally, creativity and design are implicated as cause and potential correction for many of the negative consequences of unbridled scientific development associated with the rapid growth and diversification of human activities. Such is the case when creativity is called upon to find new ways of redressing social dislocation and rehabilitating the environmental degradation that so often accompanies demographic, cultural and technological changes for example.

Central to arguing for an improved understanding of creativity in design education is the realisation that human creativity involves intentional action. Therefore, at a time when innovation is a political imperative, understanding of creativity can no longer afford to be theoretically marginalised and discounted as a rare, unpredictable or haphazard human trait. Creativity comes into play whenever and wherever people are motivated to 'make a difference' and take some responsibility in applying themselves to conscientiously 'finding a better way' to achieve some goal. Creativity is evident when individuals and/or groups of people overtly tackle challenging issues and respond positively to altered circumstances that present unexpected opportunities or threats. This indicates that creativity has as much to do with conviction, emotion, confidence, a belief in oneself, and the decision to act differently, than with any particular type of abstract thinking process or predetermined strategy for systematic problem solving.

The educational goal of this inquiry is to explicate a more holistic appreciation amongst design teachers of creativity as a higher order human capability that can be encouraged in most if not all learners. Without necessarily referring to specific tasks or content applications this desire for a creatively heuristic self-actualisation mechanism is consistent with what Usher (1996, p.19) describes as 'knowing differently' using a 'double hermeneutic' where all participants engage in 'making sense' of the peculiarly

human experience of 'being creative'. This requires an interpretive approach to knowledge generation that is neither teleological nor linear but more circular or spiral in nature, exercising a certain gestalt characteristic whereby '… the interpretation of part of something depends on interpreting the whole, but interpreting the whole depends on an interpretation of the parts'. This echoes the adult education view of Marton (1988, p.66) noted previously.

From a hermeneutic research viewpoint therefore, it is important to find ways of interpreting both theoretical and anecdotal evidence to potentially assist educators in better understanding creativity. Two research tools have been created and are discussed in the following pages to assist in this process. Firstly an Operational Model of Creative Questioning (Figure 2:2) was developed. Secondly a qualitative practitioner survey was conducted, with the assistance of the Design Institute of Australia, on Key Aspects of Creativity for Teaching and Learning in Design Education (Appendix 1).

Operational model of creative questioning

An Operational Model of Creative Questioning was generated at the beginning of this investigation as a heuristic device to assist in 'double loop' interpretation of design challenges. The model foregrounds and makes explicit 'pre-understandings' in the research design by indicating 'how' self-initiated design discovery operates in practice using future oriented open-ended questioning. As such, the model provides an exemplar that holds true as a benchmark for encapsulating certain constructs of creativity implicit within the action of designing. This reflects a performative status quo, which is likely to be very familiar to those with a vested interest in sustaining creative engagement with the world on a daily basis, such as designers and design educators, including this researcher.

The Operational Model of Creative Questioning, introduced below in Figure 2.2, describes a cyclic double-loop principle of creative activation. In subsequent chapters the likely origins of many of the presuppositions underpinning the model are actively cross-referenced, reflecting upon and validating their functionality in design education. The practitioner survey, discussed next, was conducted to test and confirm the currency of various notions of creative questioning covered in the model. Though the model is not

definitive, it does represent a guide or template for demonstrating how creativity may be readily targeted by teachers in design education using the open-ended questions *'What if?'* and *'Why not?'* as stimulus. The pedagogical difference between this sort of open-ended questioning and the more conventional 'what' and 'why' type of questions often employed in educational assessment is expounded in Chapter 7 where the model is included a second time as Figure 7.1 along with accompanying in-depth analysis.

Figure 2.2: Operational Model of Creative Questioning (also shown as Figure 7:1 p. 222).

Embodied Design Attitudes
HOLISTIC HIGHER ORDER CREATIVE CAPABILITIES
Enacted sense knowledge
Speculative questing for Motivation and Meaning
Integration of other design and existential knowledges involving
Discernment, Critical Judgement and Reflection-in-Action within
Multiple social contexts and Communities of Practice for Identity
Learning as Experience, Doing, Belonging and Becoming

What if? - **CREATIVITY** - *Why not?*

You reject certainty
Question the familiar
Pursue potentialities, argue alternatives
Value difference, promote diversity
Visualise new possibilities
Generate multiple ideas (ideation)
Develop fresh concepts, make different
Explore concurrent feasibilities
Challenge the odds, explore probabilities
Multiply, divide, subtract, add options
Make alien, unusual, ugly, unfamiliar
Select review, refine, reject options
Reinvent, reengineer, reevaluate, reflect
Reinvigorate the mundane
Pioneer, seek the unknown & unexpected
Invent, innovate, speculate, ruminate
Defy inevitability, deny impossibility
Reshape destiny
Create

Look
See/Perceive
Feel/Experience/Value
Believe/Question
Visualise/Imagine
Forecast/Envisage the Future
Brainstorm/Mindmap
Make new Meaning
Act/Apply/Adapt
Do/Make/Prototype
Scrutinise/Evaluate/Challenge
Analyse/Judge/Critique
Rework/Remake/Repurpose
Frame/Mount/Present
Discuss/Review/Refine
Produce/Market/Distribute
Use in Context/Check Reality
Double loop
Feedback

Try, take risks, play, discover
Explore, experiment, provoke, tease, unravel
Guess, gamble, read, puzzle, worry, annoy
Speculate, hypothesise, problematise
Trial, test, model, mould, unmake, abuse
Modify, manipulate, mutilate, fracture
Remember, dismember, deconstruct
Falter, fail, find, rethink, reframe, restart
Name, rename, describe, (de)contextualise
Visualise metaphor, satire, irony, pun
Appropriate, metamorphose, evolve, reconfigure
Compare, critique, ridicule, mimic, mock, mime
Narrate, mythologise, lie, trick, deceive
Amuse, delight, dally, disappoint, sadden
Fantasise, dramatise, frustrate, frighten, shock
Clutter, cluster, collect, organise, categorise
Simplify, balance, harmonise, interrupt
Interfere, tip, tumble, toss, eclipse
Restart, make new

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Primarily, the model draws on the researcher's personal experience of what it feels like, and knowledge of what effort it takes, to work in a creative manner. It also draws on the researcher's professional experience as a teacher of design over many years striving to encourage creative attitudes and work habits in students. The model reflects the type of

conceptual discipline required to translate holistic felt experiences into meaningful learning strategies in various fields of design where the overarching goal is to demonstrate how to engage in creatively oriented practices in design teaching and learning.

The model was originally devised as a heuristic tool to explain to non-designers 'how' creativity can be reliably operationalised in terms of the research problematic investigating how creativity is made teachable in design education. As such development of the model preceded the review of literature, the survey of practitioners, the subsequent conduct of the inquiry and the writing up of the academic research presented in the following chapters. Without deferring to particular design content or specialist design applications, the model pragmatically shows 'how' designers can approach any sort of thematic design enquiry from an intentionally creative perspective. The final form and purpose of the model remains consistent with the first draft presented in 1999, which was refined and re-presented in 2002 to describe one way in which virtually any theme or topic may be approached creatively.

In use, this Operational Model of Creative Questioning illustrates an alternative epistemological approach where no contextual information, content knowledge or technical skill is accepted at face value. Instead the contingency of knowledge is purposefully activated, overtly teased out and then manipulated in a conscious effort to generate multiple perspectives on the core information. As many alternatives as seem warranted are initiated and trialled, in order to disrupt pre-existing assumptions, knowledge constructs, formats or applications. In short the model can be used to render what is known 'different' or alien, making the 'familiar strange' and the 'strange familiar' (Delamont 1992, pp. 197-201). This is what Smith (1998, p.192) refers to as establishing 'connectedness… gaining access to the phenomena being described'.

Existing knowledge is intentionally 'decentred' so that new knowledge may come to the fore. New knowledge emerges precisely because the possibility of its existence is anticipated or imagined. New knowledge is actively sought and expanded by creating the epistemological 'space' needed to accommodate and deal with the implications of changed understandings. While the new knowledge remains contingent, and the

interpretive processes may be interrupted at any stage, the continuous heuristic double loop of *'What if?* and *'Why not?* queries present no definitive end point of interpretation. There is no reliance on one final, predetermined or ultimately 'correct' solution, no set answers and no 'violent' conclusions to delimit understanding once-and-for-all. In a creative approach to knowledge generation participants learn to judge what constitutes an appropriate outcome worth pursuing to fruition whilst knowing that further reappraisal and reinterpretation always remains possible in the quest for subsequent 'new' or 'revised' understandings.

Methodologically the Operational Model of Creative Questioning offers a surprisingly succinct and reasonably comprehensive map of the researcher's accumulated pre-understandings about creativity. While these pre-understandings are broadly consistent with those circulating in the art and design world, most of the convictions represent an accretion of implicit and largely unquestioned assumptions about creativity. Where did such ideas come from? The very familiarity of the *'What if?* and *'Why not?* notions suggest precedents must exist for the characterisation of creativity presented in the model. Therefore, in part the research task is one of verification tracing pre-existing language, notions and theories of creativity back to their origins wherever possible to better appreciate the social, historical and theoretical background informing this inquiry. The reflexive process assists in critiquing, not only the ongoing cogency but also the adequacy of, the underlying assertions so often used to explain what creativity means in relation to design and education. Interestingly, as a heuristic device, the Operational Model of Creative Questioning proves extraordinarily robust in the face of this examination.

Practitioner survey: **Key aspects of creativity for teaching and learning in design education**

The purpose of conducting a qualitative survey of members of the Design Institute of Australia (DIA) and their professional associates was to gather recent data on implicit knowledge and explicit views of what Australian practitioners perceive to be key aspects of creativity for teaching and learning in design education. Survey results sample the beliefs freely circulating within overlapping communities of designers and design educators in Australia. The data obtained are qualitatively rich and expansive. This concurs with much anecdotal information found in the design literature. The analysis of

survey findings is also consistent with the researcher's own pre-understanding of creativity at the outset of this inquiry. Taken collectively, the qualitative responses to the questionnaire verify the currency and substantiate the relevance of an exploratory approach to 'problem finding' and 'problem solving' encapsulated in the Operational Model of Creative Questioning even though there is no teleological relationship between the two instruments.

Most importantly, the survey of DIA members clearly exposes a significant discrepancy between implicit assumptions and beliefs about the subjective experience of creativity and professional expectations of a need to overtly explicate creativity as an objective in professional design education. While a majority of respondents declare confidence in their own personalised understanding of what constitutes creativity in various design disciplines, many readily admit or otherwise indicate far less certainty about how best to translate this sort of implicit experiential knowledge into explicit educational outcomes. This result from surveying the design industry is somewhat disappointing though not entirely unanticipated given ongoing uncertainty and debate over the nature and locus of human creativity.

From a pedagogical standpoint bridging this creativity gap from novice learner to expert design practitioner presents a critical challenge that is often left to the design educator to resolve on behalf of the design industry. While this situation impacts on all levels of design education it is perhaps most acutely felt in the vocational sector. The development of competency standards governing vocational design education and training in Australia is an industry responsibility from which educators are often excluded. Practitioner ambivalence, as expressed by DIA members, toward how creativity can be addressed in design education, highlights a serious epistemological dilemma facing Industry Skills Councils charged by the Commonwealth Government of Australian with responsibility for developing competency based national training packages that deliver genuine creativity and sustainable levels of innovation.

The qualitative survey of DIA members was titled Key Aspects of Creativity for Teaching and Learning in Design Education. It was developed and ethically approved for email distribution and anonymous hard copy return by post, via the University of

Technology Sydney Faculty of Education. The questionnaire consists of twenty questions, in four sections A. – D., distributed nationally online through the Design Institute of Australia (DIA) email network. Designers were invited, where appropriate, to circulate the questionnaire amongst professional design colleagues for anonymous completion and return. A total of forty-eight responses were received with in-depth written answers representing a 16.1% return rate. A copy of the questionnaire, a review of the survey methodology and detailed analysis and reporting of results are included in Appendix 1. A brief description of the survey with key findings from each section follows.

Section A. contains ten relatively closed questions with space provided for comments. This first bank of questions seeks contextual information about the respondent's job title, size of enterprise and nature of design practice, briefly describing type of workplace, clients and projects undertaken. Primary discipline-specific areas of professional interest and expertise are also canvassed in relation to design, art and teaching. Respondents then indicate the number of years of involvement in professional design and/or teaching practice and the highest level of qualification they personally hold. Section A. asks respondents to rate the importance of creativity in design education on a 1 – 5 scale from 'essential' to 'not important' respectively, then to indicate how good they believe their own understanding of creativity is in their main field of expertise. From ten options respondents nominate one or more common characterisations of creativity expressed in familiar language. This includes one 'other' unspecified option with space for respondents to write in their own suggestion if preferred. Designers are asked to indicate if they feel creativity operates the same or differently in various design fields and how frequently they personally discuss creativity with colleagues. Question 10 provides space for explanation after indicating what has been most significant in shaping or changing the respondent's views about the nature and importance of creativity as influenced by teachers, employers, colleagues, peers or other factors.

Key findings of Section A. confirm that the majority of respondents are experienced professionals of more than ten years working in positions of responsibility as senior designers, design directors or owner/operators of design practices employing other designers. Almost one third have also taught, currently lecture part time or are employed

full time co-ordinating specialist design education programs at a tertiary level. A good cross section of design disciplines is represented with interior designers dominating, which reflects the DIA constituency. Agreement is unequivocal that stimulating creativity in students studying in design education courses is "essential" with the vast majority stating that they personally believe they "definitely" have a good understanding of what constitutes creativity in their own design discipline.

Section B. consists of six inductive short answer questions seeking interpretive responses with reasonable space provided for written comment. Respondents are first asked to briefly describe the creative activities or work practices they use to generate design ideas, then to comment on the relative importance of 'knowledge', 'skills' or 'attitudes' in creativity. They are asked to indicate what 'beliefs' or other factors they think inhibit or promote creativity. Respondents are invited to specify what 'professional strategies' they employ to purposefully increase or enhance creative design outcomes in their own design field or workplace. The last question in Section B. asks for an educational opinion in two parts. Focusing first on what implicit or explicit 'creative teaching strategies' might help to overtly improve creative results and student outcomes in the classroom, practitioners then indicate if they feel such strategies can be applied in terms of course structure, curriculum content, training package development or teacher training.

Section B. aroused considerable interest from respondents who willingly share their personal views in copious written comments. Most agree that appropriate knowledge, skills and attitudes are all necessary in professional design practice. However a majority assert that positive, 'open minded' and creatively oriented attitudes to the work of design, to themselves as practitioners, to their colleagues as professionals and most importantly to fulfilling client needs are vital. Yet many respondents qualify their answers suggesting that such 'creative attitudes' are very difficult to specify. It is widely agreed that a 'fear of failure' represents the single most significant inhibitor to creativity and a belief in one's self and that 'anything is possible' are the greatest boon to creative confidence and productivity. A number of respondents seem to struggle in responding to the educational question. Some people noticeably balk, choosing to leave the last question in this section blank. This is taken to indicate that most practising designers intuitively understand what

is creatively required of them in completing their own design work. However they appear much less confident of how such creative self-awareness might be translated into the classroom and utilised professionally in an educational environment at a structural level.

Section C. involves three reflective short answer questions. These questions query what significant personal or professional experience and what particular practitioners, authors, theories or texts influence respondents' views about creativity. Then opinion and explanation is sought as to whether or not astute and better-informed 'creative teaching strategies' can improve creativity.

Answers in Section C. are generous and varied. Travel is cited as one of the most influential experiences impacting on the creative self-awareness of individual respondents. Benefit is attributed to exposure to other cultures and the work and ideas of other practitioners in their field of expertise at a time when they are relaxed, receptive and open to new experiences. A few respondents name prominent figures in design history and other contemporary practitioners as having a significant impact in shaping their personal design vision and views about creativity. Edward de Bono is the only author to be named regarding creativity theory and Betty Edwards is cited with respect to creative teaching strategies in design. Most notably, survey respondents make no explicit mention and do not draw any direct or indirect inferences from more than half a century of very extensive cognitive psychology research on the topic of creativity. Nor is there any mention of formal philosophical perspectives. Amongst many shared beliefs and strongly declared personal convictions, about the nature and relevance of creativity, a fair degree of ambivalence is evident concerning the potential improvement of creativity in response to better-informed teaching strategies. Some mature designers and a number of respondents with experience as educators support this notion in principle, while others select 'possibly, I'm not sure' as their answer and do not elaborate. Some respondents choose to leave the entire question blank.

The final Section D. invites observations, comments or recommendations to enhance the professional relevance of the present research into creativity as a higher order capability. Many respondents leave this area of the questionnaire blank. However others take the

opportunity to offer further considered reflection on various design related issues of personal importance to them.

The qualitative survey of DIA members substantiates the premise that, while many professional designers use common language and share certain well-established assumptions about creativity with colleagues, by and large their understanding of creativity is implicit with little or no explicit theoretical underpinning acknowledged. This suggests that the tacit views of practising designers about creativity largely go unquestioned and do not necessarily extend to include informed pedagogical insights into the potential for creative teaching in design. Those with experience in design education demonstrate strong commitment to the importance of creativity in design education but, with a few exceptions, do not generally offer any particular depth of pedagogical insight into 'how' creativity is best dealt with in terms of design knowledge, skills or attitudes.

Therefore it seems reasonable to speculate that design practitioners, recruited as part time and even full time design lecturers, who are strong on conceptual, contextual and technical design knowledge, may lack confidence in developing teaching strategies that engender creativity in students. Instead common practice in design teaching has often been to reproduce practical skills based exercises that mimic studio production procedures that teachers have found creatively worthwhile when they were students or when working as designers in industry. That there is some efficacy in this traditional approach is undeniable, however the majority of design educators cannot say why. Hence they are likely to have difficulty explaining the creative aspect of design to students, trusting instead that what does and does not constitute creativity in particular design disciplines will eventually become self-evident in critiques. Many design educators with confidence in their own creativity and professional expertise default to modelling the felt experience of designing within a 'master and apprentice' type relationship without necessarily reflecting on whether this experience translates into creative autonomy for students. Design and technology teachers in secondary schools lacking authentic workplace experience of employment as a professional designer in industry are more likely to adopt the role of a technical instructor, often avoiding or minimising their responsibilities as a creative mentor.

Unpacking the tacit process whereby designers intuit creativity gives impetus to the research problematic of 'how' creativity is made teachable in design education. To do this requires examination of relevant literature where a significantly deeper level of theoretical and philosophical engagement, pedagogical interpretation and potentially increased understanding of creativity as a higher order capability is more likely to be found.

Implications from the literature

Sourcing origins of the most prevalent ideas about creativity circulating in design and in education, as well as in the wider community, requires an extensive search of discipline specific and popular literature on and around the topic. This exposes the extent to which complementary information about creativity has long existed in many literatures outside design and education including that of philosophy, psychology and some very recent work in neurobiology. In fact the historical provenance and breadth of interest in creativity appearing in parallel bodies of theoretical and applied research is vast. At the academic level much of this literature involves highly specialised scholarship informed by very different epistemological traditions. By necessity this means that references cited in this inquiry are used selectively, to trace historical precedents that reveal the origins and range of competing informal and formal theories about creativity, without necessarily offering any detailed comparison of opposing views or any depth of content analysis.

Key historical and contextual design references include Moholy-Nagy (1965) and Kepes (1965) who chronicle the tenets of twentieth century 'modern' Bauhaus design philosophies, visual principles and studio education practices that were very widely proselytize throughout the Western world after World War II. Sparke (1986) tracks the international socio-political evolution of these and other design sensibilities, along with specific professional practices and prominent institutions throughout the twentieth century. Thackara (1988) provides a critical postmodern reflection on 'design after modernism'. Margolin (1989) and others advance critical analyses of a plethora of esoteric design 'issues'. The stated goal being to foster increasingly rigorous international engagement with design research, theory and criticism. These authors have

conscientiously sought to raise the status of the design profession at conferences and in publication by working collaboratively with a coterie of academic colleagues such as in Margolin & Buchanan (1995), Buchanan & Margolin (1995) and Cross (1982, 1995 & 1999) for example. Bayazit (2004) provides a summary of forty years of international design research from the perspective of 'design methodology and design science'. Fry (1988 & 1999) contributes an Australian perspective on sustainability to debates concerning design history, practice and education. Buchanan (2000 & 2001) and others in Australia (Swann 2000, McCalman 2005 and Gillies 2005) and elsewhere provide commentary on shifting international perspectives that impact on the political and cultural positioning of design education in a global knowledge economy.

Literature dedicated to creativity is extraordinarily rich, but frustratingly fractious. There is a legacy of notional thinking that perpetuates many popular, but at times outdated and highly questionable assumptions about the nature of creativity. Remnant language and discredited theoretical assertions about creativity also persist both within and outside various professional communities, most notably derived from early hypotheses in psychology, psychoanalysis and eugenics. A bewildering array of writing proliferates on 'what' creativity is thought to be, 'where' creativity might be identified and 'who' can be considered most likely to demonstrate 'genuine' creativity. By far the vast majority of texts are preoccupied with trying to delineate and test for various intellectual processes believed to typify creative cognition. Such material continues to exert influence over educational policy and decision making especially with respect to programs for 'gifted and talented' learners. Surprisingly little of this literature has any explicit currency in design circles. Only relatively recently has theoretical attention begun to shift onto the qualitatively affective dimensions of creativity including the role of embodiment and emotion, which are of particular interest in this study.

Most reference works on creativity emerged during the twentieth century, with notable earlier forerunners introducing parameters for later discussion in terms of genetic predisposition and 'creative thinking' for example. This includes a wealth of popular literature that has shaped design practice to some considerable degree. There was a flurry of formal research activity on creativity in the 1950s and a sustained breadth of popular and academic publication between the 1960s and 1990s. The most widely circulated and

influential of the popular literature such as de Bono (1970, 1985, 1992 & 1994) runs parallel to markedly less well known scientific theories of creativity emerging from empirical research in cognitive psychology conducted in the decades following World War II.

Most well known amongst the popular literature is the prolific work of Oxford Rhodes Scholar Edward de Bono who earned honours degrees in psychology and physiology and a PhD in medicine. Therefore de Bono cannot be readily dismissed as ignorant of other more academically oriented bodies of knowledge on the topic. By the mid 1990s de Bono (1996) had in excess of 56 books translated into 34 languages plus two television series, having visited 52 countries to establish an international reputation as, '… the leading international authority in conceptual and creative thinking'. De Bono also exerts considerable educational influence over how creative thinking is taught as a skill via the Cognitive Research Trust (CoRT) established in 1969, which is used in many schools in the USA and around the world. Among other initiatives de Bono is attributed with coining the term 'lateral thinking' and originating the 'Six Thinking Hats' method for disaggregating different perspectives or mental processes required to address complex problems and constructively map a range of potential solutions from different points of view concurrently.

Armed with a view of the human brain as a 'self-organising system' de Bono has developed and continues to widely disseminate various practical techniques or 'tools' designed to promote creative thinking. De Bono's language and his rationale for explaining and justifying creativity, delivered via books, electronic media, international lecture programs, commissioned seminars and workshops, may represent the single most widely accepted creative strategies employed in the Western world. De Bono's advocacy of lateral thinking covers notions of 'creative pause', 'challenge', 'the concept fan', 'provocation and movement' including 'arising', 'escape' and 'stepping stone provocation', 'random input', the 'stratal' sensitising technique and the 'filament technique' to name just some of his many approaches. Only selected themes are referred to in this inquiry.

Along with the 'six thinking hats' principles, de Bono's view of creativity has been very successful in overtly impacting generations of individuals in communities, schools, universities, small businesses and corporations, as well as governments over the past half century. The strength of de Bono's view of creativity lies in his promulgation of the powerful idea that creativity involves consciously thinking and acting differently, always searching for alternate ways of knowing beyond the narrow dictates of technical rationality. However the weakness, or more accurately the self-limiting aspects, of de Bono's theories are threefold. First, his many undoubtedly useful thinking strategies for generating new ideas are generally offered and accepted uncritically. Secondly, his creative strategies tend to be applied instrumentally when used in teaching and learning contexts. Thirdly his characterisation of creativity, though expansive and detailed, is almost exclusively predicated upon honing intellectual abilities. De Bono therefore tends to neglect the situatedness of other potentially useful sensibilities, especially those derived from physical engagement with creative work, namely the mastery involved in corporeal knowledge. This does not necessarily make de Bono wrong. However, it does draw attention to the need to look beyond the cognitive and instrumental dimensions for a more holistic and fully embodied understanding of creativity.

De Bono's focus on thinking is consistent with the vast majority of literature on creativity concerned with understanding the cognitive processes of the conscious mind. Other popular authors such as Harman & Rheingold (1984) look to the unconscious to explain 'breakthrough insights'. Authors like Weisburg (1986) rail against many of the so-called 'myths' and long standing folklore surrounding the question of creativity, rejecting the idea that creativity involves exceptional circumstances or abilities. Weisburg uses a rational approach to refute notions of the creative unconscious, divine inspiration, instantaneous enlightenment, leaps of imagination or accidental discovery along with popular conceptions of genius, innate talent and genetic aptitude. Instead he argues that creativity lies within the applied potential of all people simply by marshalling the incremental accumulation of knowledge and experience and bringing this to bear during routine problem solving activities.

Koestler (1964) and Joas (1996) correlate creativity not so much with thinking as with imagination and socially informed action. In the process they both acknowledge the potentially inhibiting influence of normative rationality that is associated with a dominance of scientific method and logic, which they argue stifles creativity. Commenting on 'creativity in the postmodern age' Joas (1996, pp. 244-255) critiques what he asserts is a postmodern misrepresentation of scientific method and 'progress' that disregards a sociologically informed view of creativity. In relation to social science and his own theory of creative action Joas draws attention to a three-way distinction of 'comprehensive creativity' in the 'humanist psychology' of Abraham Maslow (1962). Here 'primary creativity' is equated with mood or demeanour as seen in fancy, imagination, playfulness and enthusiasm. 'Secondary creativity' is related to practical applications like 'the rational production of something new in the world' in terms of solving technical, scientific, artistic or everyday practical problems. Thirdly, integration of Maslow's primary and secondary creative considerations is said to constitute 'higher creativity' that Joas insists, 'does not spurn rational and critical control' and where 'the openness of self articulation is wedded to the responsibility of self control'. Maslow (1962, p. 143) explains integrated or higher creativity where '… succeeding upon the spontaneous is the deliberate; succeeding upon intuition comes rigorous thought, succeeding upon daring comes caution; succeeding upon fantasy and imagination comes reality testing'.

What is most interesting about this sort of approach is that it begins to foreground ontological over epistemological considerations. At a practical level this might be considered to advance the holistic creative experience of 'doing' informed by practical judgement. The cognitive processes of abstract and pre-emptive creative thinking are thereby relegated to a complementary position. Scientific information is often used casually in popular literature to substantiate different motivational and self-actualisation strategies. Popular 'how-to' publications for example often seek to promote sensitivities through heightened 'artistic' awareness or (re)awakening of creative potential thought to exist to some degree in all human beings.

Methods for improving creative self-determination are available in such works as *The Artist's Way: A Spiritual Path to Higher Creativity* by Julia Cameron (1995) that promotes a 'course in discovering and recovering your creative self'. A sequel titled *The Artist's Way at Work: Riding the Dragon* by Bryan, Cameron and Allen (1998) offers 'twelve weeks to creative freedom'. Using a somewhat similar but more grounded and hands-on practical approach Betty Edwards (1993 & 1995) republished her widely acclaimed strategies from the 1970s and 1980s for learning to draw creatively. In *Drawing on the Right Side of the Brain: How to Unlock Your Hidden Artistic Talent,* and *Drawing on the Artist Within: How to Release Your Hidden Creativity,* Edwards attempts to explain creativity and visual perception in relation to practical drawing exercises. She demonstrates how to sharpen individual powers of visual observation, interpretation and translation into drawn images on paper. These sorts of references are popular because they are very positively written in plain English and are overtly intended to build personal confidence and capacity. They speak directly to the reader and are therefore extremely successful as self-help, skills-based publications that appeal to the self-improvement aspirations of individuals and support the teacher's desire to help others fulfil their creative potential – in a practical way. Along with de Bono, Betty Edwards was singled out as having significantly influenced Australian designers' and design educators' views on creativity as noted in the practitioner survey of DIA members conducted for this inquiry.

Other more conscientiously academic works provide well-researched overviews of applied theory in terms of creative behaviours, practices and conditions. For example Piirto (1998) focuses on self-actualisation and personality development in *Understanding Those Who Create*, gaining certain currency in gifted and talented education circles. Literature such as this often seeks to extrapolate understanding of creativity from histories of eminent people and case studies of particularly talented individuals and practices deemed typical of different creative fields. Here emphasis is placed on identifying common behavioural patterns that may be generalised and taught to others, or descriptions of conducive circumstances that may be reproduced in the hope of better facilitating creative output.

Scientific literature pertinent to creativity is extensive and for the purposes of this study is dealt with in two broad categories covering cognitive psychology and neuroscience. Psychology informs the social sciences including education. Therefore many of the research studies conducted in the latter half of the twentieth century have left an indelible, though not necessarily coherent or intelligible, imprint on educational theory and practice. In psychology a great deal has been written since 1950 when retiring President of the American Psychological Association J. P. Guilford famously remonstrated with members over their empirical and theoretical neglect of research into creativity as an important human attribute. In so doing Guilford set the research agenda for the next half century.

For example, cognitive psychology research into the 'symbolic structures' of the mind informed particular technological enquiries into artificial intelligence (AI) as avenues of digital engineering and 'design science'. Discussing the 'belief that there are common foundations for both brain science and computer science' Bourtchouladze (2003) notes:

> In the 1950s, the notion that neurons were digital 'on-off' switches, and that brains and newly emerging digital computers therefore had similar structural organisations, captured the imagination of scientists. It became fashionable for psychologists to adopt the terms and concepts of the information-processing approach used by computer scientists. Terms such as short-term storage buffers, long-term storage units, processing components, nodes, modules and binary units of information were quickly incorporated into the psychologists' vocabulary and used to explain human memory. (Bourtchouladze 2003, pp. 18-19)

Research in cognitive psychology often characterised human creativity as 'problem solving', theorising cognitive functionality in terms of 'complex information processing'. Resulting experimental research, design methodologies, computational algorithms, systems modelling and technological emulation of 'neural networks', fuelled conscientious academic interest and commercial activity in computer hardware and software development. This spawned a plethora of information processing programs and digital communication technologies, from the 1960s to the present day. Herbert A. Simon (1969) is a key American protagonist in this movement. He links cognitive psychology with computer science, studies in design and creativity and artificial intelligence. Though many of the assumptions underpinning Simon's work were later contested (Boden 1999, pp. 357-360), the 1969 publication of *The Sciences of the Artificial* continues to exert significant influence over emergent 'design science' theories and philosophies. Such

research has had particular relevance for scientific priorities and methodologies in industrial, computer aided and digital design, engineering, information technology, communication and innovation studies (Bayazit 2004 pp. 16-28).

Subscribing to Simon's rationalist view of design as the scientific study of the 'artificial', including man-made 'symbols and images', 'things', 'actions', 'environments and systems', Buchanan (2001, p. 190 & 201-203) identifies the 'cognitive processes of decision making as the key to understanding design'. However, subsequent advances in neuroscience refute digital analogies for human brain function, especially with respect to complex higher order capabilities such as creativity. For example, Claxton (2005, pp. 304-307) concludes:

> For many years, cognitive scientists – people who were used, in their professional lives, to stringing clear propositions together into logical arguments – assumed that that was how the brain worked too. The basic 'code' of the brain was like a language, and it 'thought' by linking clear statements together in logical ways. This view was largely inspired by the predominant but profoundly mistaken assumption that the mind (and therefore presumably the brain) was structured like a digital machine. The brain was our on-board 'neck-top' computer.

Arguing that traditional education acts to inhibit creativity Claxton identifies 'two problems with the computer metaphor':

> The first was that it was based on the Cartesian model of human reason, and therefore was ill-equipped, right from the start, to offer any account of non-rational phenomena… And the second problem, put crudely, is that nobody ever found a syllogism in the temporal lobe, or a CPU in the pre-frontal cortex. Even the parts of the brain that *are* specialised for language turn out to have been originally designed to control non-verbal forms of action and perception. … (that) the brain can *emulate* a computer… in a number of ways… I suspect… (is due) largely (to) education that cultivates these neural knacks. Through a concerted and protracted program of coaching, teaching and modelling, many youngsters' brains master the trick of linear, focused reason… But the fact that the educated brain can learn to set itself into this useful mode does not mean that rational thought is its only, or even its most important, modus operandi… creativity, the ability to relax some of these neural constraints – to *stop* doing the inhibitory trick – is essential if fresh patterns, links and ideas are to be discovered. (Claxton 2005, pp. 304-306)

Consequently the present investigation into how creativity is made teachable in design education judiciously sets questions of information processing, computational science and artificial intelligence to one side. While it may be of tangential theoretical interest, such literature unfortunately offers little or no affective or experiential insight into the 'felt experience' of embodied and enacted creativity in the human subjects of design education.

It is impossible to attempt here even a moderately comprehensive overview of all the avenues of past inquiry in cognitive psychology. However, it is worth noting some other key themes evident in selected meta-analyses of the psychological research. Acknowledging twenty years after Guilford's challenge that much research into creativity is 'controversial and indecisive', Vernon (1970) attempts to 'show the range and variety of work in the area (of creativity), both theoretical and applied'. His editorial emphasis at that time was to examine the 'differences between individuals in their abilities and personality characteristics that underlie the production of artistic or scientific work which is generally recognised as creative or original'. The twenty seven essays in this volume, grouped under the following six themes, include in-depth academic discussion of a wide range of issues such as:

- Pioneering Empirical Studies - examining different notions of 'genius'
- Introspective Materials - offering biographical insight into the original writings of high profile creative people like Mozart (c1789), Tchaikovsky (1878) and Poincare (1924)
- Theoretical Contributions - dating from Freud (1908) in 'Creative Writers and Day-Dreaming' and Wallas (1926b) with 'The Art of Thought', Rogers (1954) 'Towards a Theory of Creativity' and Cropley (1967) in 'S-R Psychology and Cognitive Psychology' among others
- Psychometric Approaches - of which two influential contributions are from Guilford (1959) 'Traits of Creativity' and Getzels and Jackson (1963) 'The Highly Intelligent and the Highly Creative Adolescent'
- Personality Studies - such as Barron (1955) 'The Disposition toward Originality'; Taylor and Ellison (1964) 'Prediction of Creativity with the Biographical Inventory', and
- Stimulating Creativity – notably Parnes (1963) 'Education and Creativity' and Torrance (1962) 'Causes for Concern', concluding with Haddon and Lytton (1968) 'Teaching Approach and Divergent Thinking Abilities'.

Thirty years on, Sternberg (1999, p. 449) proffers an edited collection of twenty-two authoritative essays from leading creativity researchers. Here Mayer summarises 'Fifty

Years of Creativity Research' to assert that this volume is, 'a progress report on how the field of creativity research has developed':

> … representing a seemingly chaotic diversity of research methodologies and questions … (where) the ongoing challenge for creativity researchers is to create new and useful research methodologies … (by exploring) two research issues underlying an agenda for creativity research – what to study and how to study. (Mayer 1999, p. 449)

In addition to introductory discussion of 'The Concept of Creativity: Prospects and Paradigms' and a very detailed but predominantly scientific overview of 'A History of Research on Creativity', Sternberg divides his meta-analyses into:

- Methods for Studying Creativity
- Origins of Creativity
- Creativity, The Self, and The Environment
- Special Topics in Creativity – including commentary on cultures, computers, organisational issues, enhancing creativity and prodigies.

Among many other prominent individuals continuing to make significant contributions to creativity research within the context of cognitive psychology, it is worth singling out Gardner (1999) and Csikszentmihalyi (1996), and more specifically Goleman (1996) for special attention. Acknowledging his hierarchical designation of 'small c' creativity and 'big C' creativity noted earlier, and renowned for his theory of 'multiple intelligences', Gardner (1999) asserts a very particular view of creative cognition:

> As long as intelligences are restricted to the processing of "contents in the world", we should avoid epistemological problems... The concept of "intelligence" should not be expanded to include personality, motivation, will, attention, character, creativity, and other valued human capacities... I call… for a delineation of intelligence that includes the full range of contents of which human beings are sensitive, but excludes such valued but separate human traits as creativity, morality, and emotional appropriateness. This delineation makes scientific and epistemological sense… (Gardner 1999, pp. 204-207)

Expressing many views in common with Gardner, Csikszentmihalyi (1996, pp. 11 & 110) has risen to prominence with a 'systems approach' to creativity based on the notion of 'flow'. 'Flow' describes a quality of experience and emotional satisfaction in challenging activities that involves 'novelty and discovery' and stretches individual capacity so that 'optimal experience… (is) almost automatic, effortless, yet highly focused state of consciousness'. Csikszentmihalyi privileges 'big C' creativity in terms of three elements

including 'symbolic rules' within a culture, 'novelty' in a symbolic domain initiated by a person, and 'innovation' validated by a field of experts. For Csikszentmihalyi context, scope and far reaching impact are most significant where creativity is implicated in 'lives that are rich and fulfilling'.

Goleman (1996, pp. 20 & 28) disagrees with Gardner in attempting to turn 'the old understanding of the tension between reason and feeling on its head'. In his account of 'emotional intelligence' Goleman looks at learning and memory in relation to brain evolution arguing:

> … "cognitive unconscious" presents awareness with not just the identity of what we see but an opinion about it. Our emotions have a mind of their own … which can hold views quite independent of our rational mind… Those unconscious opinions are emotional memories…… involved in…making sense of perceptual patterns with emotional reactions… (and) providing a keen memory for context, vital for (understanding) emotional meaning …. (Goleman 1996, p. 20)

Broadening discussion of creativity to take account of neuroscientific research turns on the work of authors such as Damasio (1994) to be found in a variety of sources including interdisciplinary anthologies such as *The Origins of Creativity* edited by Pfenninger and Shubik (2001). This text examines 'the biology of the brain and creativity, as well as associated functions of the mind, such as imagination, perception, and emotion'. Given that the discipline specific writing of Damasio (1994) makes developments in neuroscience intelligible to the uninitiated, it is no wonder that his research and writing have become popular. No more so than where he uses neuroscience to debunk positivist dogma such as in *Descartes' Error: Emotion, Reason and the Human Brain*. Commenting on the physical relevance and functioning of imagination, creativity and emotion Damasio (2001) argues that understanding creativity is, not so much a matter of explaining neural circuitry or genetics as it is, a matter of interpreting the interaction between individuals and the particular environments informing production of 'social and cultural artefacts'. Refuting old assumptions, Claxton (2005) asserts:

> The mature brain learns more by finding new connections between what it already knows than by the earnest acquisition of new information, and to do that, you need reverie just as much as you need reason. If it is to be as smart as can be, the brain must remember how to let itself paint with watercolours on wet paper, and let ideas bleed into each other, as well as learn how to draw neat diagrams with a sharp pen. On the old view, if the brain was fundamentally a rational machine, it was hard to explain how and why it so often seemed to operate in ways that were very different, and which the rational view was forced to view as inferior: intuitive, poetic and symbolic. But now we are freed of this restrictive intellectual perspective, and equipped with some general understanding of how very different the organic brain is from a silicon-based laptop. (Claxton 2005, pp. 306-307)

With the turn of the twenty first century this line of inquiry brings the investigation of creativity to the realisation that the human mind cannot be theoretically dissociated from the body. Rather the human mind exists as a fully 'embodied' aspect of whole persons. Authors such as Lakoff and Johnson (1999) explore the resulting implications to conclude:

> The traditional Western view of the person is… at odds *on every point* with the fundamental results from neuroscience and cognitive science… An actual human being has neither a separation of mind and body, nor Universal Reason, nor an exclusively literal conceptual system, nor a monolithic consistent worldview, nor radical freedom… since Socrates, the fundamental invocation of philosophy has been to "know thyself". To know ourselves individually, we must know what we are like as human beings. (Lakoff & Johnson 1999, pp. 554-555)

Here science meets philosophy as the ontological issues begin to come to the fore. In response Welton (1999, pp. 2-4) has collected together ideas on *The Body: Classic and Contemporary Readings*. Reversing tradition, so that what is meant by the body is not predicated upon patently inappropriate definitions of mind, Welton challenges traditional philosophical denigration of the body suggesting that, '… it renders impossible an account of embodiment – of corporeality understood in terms of human actions upon, and involvement with, the world'. Welton and others rebut past assumptions about the pre-eminence of mind, based on Cartesian dualism, to open up the discussion of creativity in terms of a more holistic notion of 'personhood'. Two particularly relevant phenomenological formulations drawn from Martin Heidegger (1972) and Maurice Merleau-Ponty (1962) then provide a richly interpretive and existential basis for examining creativity in a more fully embodied way. Heidegger's notion of human existence as 'Dasein' or being-in-the-world, '…turns from the question of the body to the question of embodiment'. With particular reference to the visual arts, Merleau-Ponty extends the discussion of embodiment. He ponders deeper phenomenological meanings and motivations associated with felt sensitivities of the physical body as 'flesh' in a detailed analysis of the 'internal connection between the body, actions and perception' expounded in *Phenomenology of Perception*, and later essays such as 'Eye and Mind' critiqued by Dillon (1988), Johnson (1993) and others.

Bernstein (1999, pp. 80 & 202) explores the interpretation of informed action in relation to experience and practice in *Praxis & Action: Contemporary Philosophies of Human*

Activity. Bernstein links an esoteric phenomenological perspective with an applied pragmatic view of education. This is relevant in terms of Dewey's 'faith in creative intelligence, (and) in his fundamental belief that through the educational process we can create a new type of (person) and a new type of society'. Bernstein draws attention to Dewey's stance in *Creative Intelligence, Essays in the Pragmatic Attitude* that argues, '… the only alternative to developing … creative intelligence is to allow ourselves to be misshapen and dehumanised by powerful social forces'. Hickman and Alexander (1998, pp. 399) record Dewey's views on aesthetic life experience where, 'To the being fully alive, the future is not ominous but a promise… In life that is truly life, everything overlaps and merges…Art celebrates with peculiar intensity the moments in which the past reinforces the present and in which the future is a quickening of what now is'. Rorty (1982) takes the social science connection much further to position Dewey at the end of the same 'dialectical road' as Foucault and others, 'interpreting other people to us, and thus enlarging and deepening our sense of community':

> Once this pragmatist line is adopted, however, there are still two ways to go. One can emphasise, as Dewey did, the moral importance of the social sciences – their role in widening and deepening our sense of community and the possibilities open to this community. Or one can emphasise, as Michael Foucault does, the way in which the social sciences have served as instruments of "the disciplinary society", the connection between knowledge and power rather than that between knowledge and human solidarity… We should see Dewey and Foucault as differing not over a theoretical issue, but over what we may hope. (Rorty 1982, pp. 203-204)

Aspects of both these perspectives are echoed in what Wenger (1998, pp. 230-240 & 253) has called a 'social theory of learning', expanded under the rubric of 'learning architectures' or 'design for learning'. In relation to learning, meaning and identity Wenger emphasises the critical importance of engaging participant allegiance, which 'depends on the communities of practice in which their engagement and their identities constitute each other. Indeed, the kind of personal investment and social energy required for creative work are not a matter of institutionalised compliance or abstract affiliation; they are a matter of engaging the identities of participants'.

Prior to Wenger's analysis, the importance of genuine physical, intellectual and emotional investment in creative activities, for both teacher and learner, has been shown to hold true not only at the individual but also at collaborative level. Schon (1983, 1985 & 1987) for example came to similar sorts of conclusions about the function of learning, meaning and

identity, as well as 'reflection in action'. With his theory of the 'reflective practitioner' Schon is one of the few to theorise the practice and education of creative designers. While valid criticism (Usher, Bryant & Johnson 1997, pp. 142-170) has drawn attention to limitations in the work of both Wenger and Schon this in no way diminishes the value of their separate analyses of creative practice for this inquiry. As a qualitative trans-disciplinary study into creativity as a higher order capability the pioneering work of Schon in architectural education is especially relevant for this investigation into how creativity is made teachable in design education.

In addition to that mentioned above various other literatures have been used to track values and attitudes about creativity in the evolution of design and design education, with specific reference to broader educational concerns. Employing the views of Wenger, design, education and design education are conceived in this study as three intersecting communities of practice wherein creativity and learning are discussed in primarily ontological terms in relation to embodiment and holistic 'doing', 'belonging', 'becoming' and 'experiencing' professional design practice. This approach is pertinent in light of a veritable explosion of official consultations, field studies and government reports over recent years, discussed throughout the text, that rhetorically probe the case for creativity and innovation, especially in relation to educational reform.

A notable feature of this recent government sponsored literature in Australia, England and elsewhere is the recurrent restructuring of education and training systems. This is accompanied by often strident calls for the reform of teaching and teacher education practices with increased concern being expressed about 'how' people might be better encouraged through education to act in more creative and entrepreneurial ways. An unfortunate characteristic of much of the Australian literature is the tendency to equate innovation very narrowly with instrumental views of science, technology and mathematics, which has only belatedly come under scrutiny in relation to the humanities, arts and social sciences. Until recently, the Australian Government's commitment to innovation under the $3 billion policy agenda of 'Backing Australia's Ability' paid little attention to creativity or indeed the role of the humanities with respect to design

(Department of Education, Science and Training, 2003). The same is not true of similar policy literature in England.

Constant vigilance is required to unravel the tangle of assumptions and expectations from the weight of largely unacknowledged prejudices and exclusions in the politically motivated literature. At times this can border on an aversion to creativity based on many ill-founded, but no less negative, presuppositions about the nature and consequences of creativity. For example, ambivalence persists around the 'subjective' nature of creativity, which at its most extreme harks all the way back to Plato's reservation about the corrupting influence of poetry. Later psychoanalytical conflation of creativity with irrational, undisciplined eccentricity, and the unleashing of self-indulgent unruly emotions or anti-social behaviour are clearly at odds with the professional discipline required to bring innovative design ideas to fruition as mass manufactured goods or services in a global economy.

Nevertheless growing recognition of the value of creativity is evident in numerous applied national and international research papers and policy documents, which are drawn from a wide range of professional, institutional, industry and government reports. This information acknowledges that priority needs to be afforded the pursuit of creativity in education. It situates the conceptual discussion of creativity within specific social and cultural debates, especially in relation to the quest for 'innovation'. The pivotal role of education and to a lesser extent design is canvassed in relation to the intersecting aspirations of different community sectors and interest groups. Of particular note is the mounting pressure of expectation being brought to bear across all sectors of primary, secondary and tertiary education to comprehensively affect rapid social change and facilitate cultural transition from old craft based industrial and manufacturing economies into the new knowledge based economies of the 'information age'.

Perhaps the most internationally significant and expansive literature examining the importance of creativity and design education stems from England in the form of interlocking research projects involving government authorities, schools, vocational colleges, universities and a wide range of industry participants. For example, *CREATIVENET* provided an online forum for interactive debate affiliated with the British

Design Council that benchmarks the priorities of a 'creative age' (Florida, 2002, 2004 & 2005) in being dedicated to open dialogue on the interrelationship of creativity, education and design. This project was largely framed in the context of British government efforts to map and stimulate activity in the creative industries. The Design Council is actively supported and encouraged by the British Government. Prime Minister Tony Blair is quoted in the report of the National Advisory Committee on Creative and Cultural Education titled 'All our Futures: Creativity, Culture and Education' (1999) confirming that, 'Our aim must be to create a nation where the creative talents of all the people are used to build a true enterprise economy for the twenty-first century – where we compete on brains, not brawn'. This statement encapsulates a widespread international sentiment embraced in the UNESCO World Culture Report on 'Creativity and the Arts':

> UNESCO seeks to foster a social and legal environment that is conducive to creative activity and critical thinking in all its forms. It encourages both individual creativity, with its roots in traditional and popular culture, and industrial creativity, which draws its force from social and economic institutions that stimulate market activity and innovation. (Arizpe 1998, p. 1)

Such sentiments spawned numerous industry and government sponsored inquiries. In Britain this includes the 'Future Issues in Design Research' (1999), 'Skills Task Force Research Group' (2000), and the 'Creative Industries Mapping Document' (2001) among other related initiatives. Similarly, in Australia the Commonwealth Government launched various research initiatives in an attempt to stimulate innovation. But despite the considerable resources allocated to such investigations in Australia they have so far generally failed to extend much beyond superficial observation and idealistic exhortation. Most reports gloss over exactly what aspects of creativity or innovation might be considered important for education to address. Therefore the rhetoric contributes little to addressing the issue of how creativity is thought to impact on the processes of teaching and learning in the classroom or on-the-job.

Britain led investigations into what improving creativity might mean for education by identifying five stakeholders in the change management process. These include the competing needs and expectations of government agencies, curriculum developers, teachers, pupils and researchers whose separate perspectives are not necessarily always compatible in the quest to stimulate technological innovation. A Strategy Group was composed of government, higher education, business and industry representatives

working with local education authorities and professional bodies. The group proposed a comprehensive raft of educational recommendations in 2003 to develop innovative practice, reform the school workforce, encourage partnerships beyond the classroom and reform the secondary design and technology curriculum. Coordinating researcher, on this and other high profile British government projects to do with creativity, design and technology education since 1999, Barlex (2004) reports that, with no adequate explanation, this much vaunted process 'stalled' prior to government implementation.

Concurrent Australian government initiatives, largely under the auspices of the Department of Education, Science and Training (DEST), include the 'Knowledge and Innovation' (Kemp, 1999) policy statement on research and research training and the 'Evaluation of the Enterprise Education in School (EES) Element of the School to Work Programme' (Young, 1999). The Commonwealth Government strategy for a 'Competitive Australia' resulted in the 1998-2000 establishment of Prime Minister John Howard's 'Science, Engineering and Innovation Council' (DSIR, 2000). This effort led to an Innovation Summit titled 'Innovation – Unlocking the Future' (Miles, 2000) and the Australian Science Capability Review titled 'The Chance to Change' (Batterham, 2000). As an 'agenda for action' the government then commissioned a report into 'Australia's Teachers: Australia's Future – Advancing Innovation, Science, Technology and Mathematics' (Committee for the Review of Teaching and Teacher Education, 2003). This represents just some of the many consultation papers, research projects and reports canvassing ways to boost innovative performance on a national scale.

Unfortunately, despite the best of intentions and the extraordinary breadth and persistence of consultation, most Australian research in this area, along with the associated policy initiatives and resulting academic reports have proven largely ineffectual in improving the status quo. Taken together, this research effort offers little more than belated recognition of inadequate 'soft skills' development and the increasingly critical need to engender enhanced creativity if Australia is to deal productively with scientific and other opportunities associated with technological change. This is borne out in the Higher Education Report for the 2000 to 2002 Triennium (DETYA, 2000). Government commissioned ACNielson research (2000, p. viii) confirms that employers consider, 'the

greatest skill deficiencies amongst new graduates were … in the areas of creativity and flair; oral business communications; and problem solving… (with) Creativity and flair… the most important of all the skills tested'. Much subsequent government-funded research is critical of perceived shortcomings in the Australian education system at all levels reiterating often strident recommendations to qualitatively improve teacher training with respect to innovation and enterprise issues. However, such recommendations tend to skirt direct discussion of creativity and therefore fail to articulate precisely 'how' the desired shifts in pedagogical knowledge, disciplinary understanding and creative performance might be achieved in education, training and other contexts including the workplace.

In answer to the demand for enhanced creativity, not forthcoming from previous government emphasis on mathematics, science and technology, a new national body was announced in May 2003. The inaugural Annual General Meeting of the Council of Humanities, Arts and Social Sciences (CHASS) occurred in Canberra 1 May 2004. In large part this represents a rearguard response to severe declines in funding and escalating marginalisation and attrition impacting the humanities, arts and social sciences in Australian universities. As such CHASS entered the innovation debate with vigour. CHASS first gained a place on the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) as of 1 March 2005 followed by the appointment of Professor Ian McCalman (2005) to chair the working group on 'The Role of Creativity in the Innovation Economy'. The CHASS submission to this working group, which is due to present its findings at the 14th PMSEIC meeting in late 2005, focused on 'three overarching questions':

1. What is the role of creativity in the Innovation Economy?
2. How can we foster and develop creativity in ways which support economic development?
3. How do we support the development of productive and practical relationships across HASS (Humanities Arts and Social Sciences) and STEM (Science Technology Engineering and Medicine) disciplines to enhance creativity, in terms of education and training, research and other productive fields of activity? (McCalman 2005, p. 1)

Notwithstanding very substantial investment in previous reviews of teacher education in Australia at both state and federal levels the first House of Representatives Standing Committee 'national inquiry into teacher education… in 25 years' was announced 17 March 2005 (Nelson, 2005), coinciding with the emergence of CHASS. This latest inquiry will 'examine very carefully the philosophical underpinnings of teacher education

in Australia… inquiring directly into the way in which teachers are being prepared in terms of not just specific skills but the philosophies and scientific rigour of teacher training in Australia'. By way of example the Australian Government Minister for Education, Science and Training Dr Brendan Nelson points to the educational inadequacy of some teachers in being incapable of explaining even basic literacy and numeracy concepts to pupils. Exactly the same sort of difficulty pertains to teaching for creativity and innovation.

Trainee and experienced teachers very often struggle to identify and interpret underlying pedagogical principles upon which to build credible creative teaching and learning programs for students in schools, vocational colleges and higher education institutions across most disciplines including design and technology. Therefore, for this study into creativity as a higher order capability, key questions remain unanswered with respect to explicating intuitive understandings of the nature of creativity and how it might be better targeted in the teaching and learning of design. In-depth discussions, that seek to unpack and contextualise notions of how creativity operates, are commonplace within the professional community of designer practitioners, utilising a wide range of formal and informal communication means. Prominent in this discourse between practising designers is the ongoing interrogation of creativity and its role in design and design education.

In higher education for example, dedicated international journals such as 'Design Studies' were launched in 1979 with the declared intention of, '… changing the paradigm' (Gregory, 1979). Such literature asserts that design is a future-oriented 'new capability' arguing, 'At the most general level design is an adaptive procedure, a means whereby members of the human race are able to cope with their surroundings and deal with difficulties and change'. Such definitions of design bear striking similarities with comparable definitions of creativity, almost as if designers consider design and creativity as interchangeable terms. From the 1980s onward, articles of interest appear regularly in design journals. Topics include 'Designing Design - Designing as a Creative Activity' (Jones, 1979), 'Designing for Creativity' (Rickards,1980), 'Design Creativity and the Understanding of Objects' (Daley, 1982), 'Designerly Ways of Knowing' (Cross, 1982), 'Experiencing Ideas: identity, insight and the imago' (Davies & Talbot, 1987). However

very little of this material addresses underlying pedagogical consideration of 'how' or indeed 'how well' creativity operates in a design education context.

This is of real concern to those professional educators charged with responsibility for teaching design in secondary schools. The 2004 proceedings of the 3rd biennial international conference of Technology Education Research, titled 'Learning for Innovation in Technology Education', brings pedagogical debate over creativity in design education up to the present. Despite more than half a century of dedicated research into creativity more questions than answers on this topic continue to feature in the conference papers. For example, more than fifteen years after the 1988 introduction of design into secondary technology curricula in Victoria, Baulch (2004) notes '… confusion about design arises when teachers try to determine what each element in the process actually means and how to teach it'. After conducting a State funded professional development program for approximately 600 teachers over a period of eighteen months Baulch observes that many Victorian high school technology teachers:

> … lack strategies to confidently teach a design based technology program … many really struggle with basic design concepts… It is fine to teach students how to communicate ideas but … How to get (ideas) in the first place? How do we teach them to be creative? How do we motivate them? (Baulch 2004, pp. 64-65)

In the 1990s a number of national reports were generated in Australia on the specific role of design in education. Of particular interest is 'Competing by Design – The National Design Review Report' (Freeman, 1995) pre-empting the growing focus on innovation and discussing vocational and higher education in design. Also 'Educating by Design – Key Competencies and Design Report' (Jackson & Doyle, 1996) examines design in primary and secondary school education. In each instance practitioners of design were asked about the essential processes involved in design method and practice, commenting on implications for competency development in schools and colleges, and the capabilities required from university design graduates. While this research effort focused attention on many important design issues, unfortunately it stopped well short of tackling explicit pedagogical questions of how creativity might be overtly addressed in teaching and learning. Eventually pedagogical issues began to come to the fore in research projects such as 'Generic Capabilities of Australian Technology Network Graduates' (ATN Teaching and Learning Committee, 2000) and 'Generic Skills for the New Economy'

(Kearns, 2001). But again these reports focus on defining creative thinking and instrumentally applied work processes without necessarily penetrating beneath the surface to explore key attitudinal and affective considerations that are so crucial to successfully motivating students to intentionally adopt creative approaches to learning.

Historically, it is worth noting that 'design method', along with the inherent role of creativity, has been a recurrent issue of professional and academic debated amongst international designers and design researchers throughout the latter half of twentieth century (Bayazit 2004, pp.17-22). Despite considerable literature on the topic, the debate remains unresolved, wavering on generational and disciplinary views for or against the notion of 'design science'. Serious differences of opinion persist over the relative merits of intuitive as against rational design processes, particularly those 'scientific' methodologies that utilise organisational hierarchies, systems thinking and computational protocols derived from sources such as structural engineering, computer programming, electrical circuitry or project management. This impacts significantly on design perceptions for example:

> The picture of the rational, or systematic, designer is very much that of a human computer, a person who operates only on the information that is fed to him(her), and who follows through a planned sequence of analytical, synthetic and evaluative steps and cycles until (s)he recognises the best of all possible solutions. (Jones 1970, p. 50)

In *Design Methods: Seeds of human futures* Jones (1970, pp. 45-58) discusses different methodologies used by designers in terms of a 'black box' and 'glass box' analogy. Jones equates a 'black box' design approach with inexplicable intuitive or other unconscious processes that produce creative solutions without the designers being able to give any clear account of how the outcomes are generated. By comparison a 'glass box' design methodology demonstrates rational procedures by which design outcomes are developed systematically. This involves premeditated and disciplined, sequential and transparent attention to working through specified 'input' and 'output' criteria, which is used by designers to resolve primary and subset problems in either a 'linear' or 'circular' manner. A third 'strategy control method' articulated by Jones identifies designers as 'self-organising systems' approaching complex 'indivisible' tasks by way of 'self-plus-situation (or strategy plus objective)'. This approach 'relates the results of each part of the

search to the ultimate objectives, even if, as is likely, the objectives are in a state of flux'. Ultimately, however, Jones admits a creative dilemma saying, 'It is now clear that the major weakness of any design method, and particularly the new (scientific) methods… is the difficulty of controlling strategy in novel situations and when many people are engaged upon a single design project' (Jones 1970, p. 56).

Other important literature sources include the proceedings of international conferences such as Sydney Design '99 (DIA, 1999), Milan 'Design Plus Research' (Pizzocarro, 2000) and Perth 'Re-inventing Design Education in the University' (Swann & Young, 2000) that have introduced a more critical perspective into the discussion of creativity, design and education. As previously noted, one of the richest sources of current and ongoing discussion of these issues are the sharply focused, qualitatively rich online forums and the well researched and referenced online publications managed by the British Design Council. Chief amongst the latter is 'Changing Behaviours' featuring commentary and case studies from prominent design educators and practitioners that examine design in terms of creative attitudes, actions and outcomes in which the chair of the Design Council in Britain observes:

> Creativity is a dangerous word … simply put (it) is about how we use knowledge to achieve new outcomes … it does require a shift in the way education shapes minds and builds expectations of what learning can achieve – a shift towards encouraging people to take responsibility, take the initiative and look for answers of their own instead of accepting ready-made ones. A shift towards taking risks as well. (Frayling 2001, p. 7)

Hence on two counts this qualitative inquiry into Creativity: A Higher Order Capability may be construed as 'dangerous'. First because it ventures into interdisciplinary territory in a postmodern world where all knowledge is contingent. Second because to teach others to be creative the teacher must also understand what it feels like to be creative. Both teacher and student must willingly step outside their respective comfort zones to jointly explore unfamiliar pedagogic regions and relationships. By the very nature of creativity each excursion into the unknown involves taking all manner of calculated risks. Therefore, in the following chapters many traditional assumptions about the nature of creativity are reassessed in relation to design and education.

A painstakingly circuitous and open-ended 'trans-disciplinary' approach is employed that impudently looks into some of the dark and untidy corners of past and present theoretical discussion of creativity. This inquiry into creativity knowingly takes conceptual risks. It entertains multiple investigations into the 'who', 'what', 'where', 'when' and 'why' of creativity. It calls for a conscientious suspension of belief in remnant Cartesian principles that still support the systemic privileging of mind over body in education, often to the detriment of the human heart and spirit. Interpreting the research presented here requires acknowledgement of the indivisibility of 'whole persons' as the embodied subjects of education. It calls for a critical appraisal of the powerfully convergent current of policy and quality assurance measures that inexorably drags or indeed pushes teachers toward increasing conformity in the reproduction of overly prescriptive educational outcomes. This counterproductive tendency continues to escalate, especially as the Commonwealth Government moves to increasingly dominate centralise educational policies in vocational, as well as, higher education and schools in Australia.

As an alternative to this trend, it is suggested that professional educators need to develop individual creative confidence and stamina if they are to stimulate and facilitate 'differences' in teaching practice. Ultimately this inquiry into creativity as a higher order capability asserts that, to target creativity in design education, the teacher must focus on nurturing the holistic capabilities of individuals and groups of learners working collaboratively. Design educators must consciously and willingly participate in the felt life experiences of learners in order to successfully lead students on rewarding learning expeditions into what is as yet unknown (to them) in order to discover what 'might be' in the name of creativity, design and innovation. From this investigation into 'how' creativity is made teachable in design education it is hoped that insights may be provided that prove useful for other fields of education practice, especially teacher education.

…………………

Chapter 3:

<u>DESIGN CONTEXT</u>

The fundamental question *'What is Design?'* is discussed in this chapter to establish a context for investigating how creativity is made teachable in design education in subsequent chapters. Answering this question requires that design, as a domain of professional practice, be clearly differentiated from the associated disciplines of art, craft and science.

Professional design activity is generally deemed to be a creative discipline. Most commonly it is situated within what is designated as the creative or visual arts. The term 'visual arts' is a convenient though loose collective description used to delineate the visual from the performing and literary arts. However, in addition to visual and creative concerns, it is important to acknowledge from the outset that the occupational domain of design practice has many other important contextual and cultural affiliations that distinguish it from fine art and craft. Most significantly in the Western world these include the scientific and business interests associated with industrialisation, the rise of mass manufacturing and the promulgation of new technologies and consumer products in market economies.

Visual art refers to those creative endeavours that privilege visual modes of communication. Visual art and design practices involve the production of two dimensional images, three dimensional tangible objects, spatial forms and built environments, as well as what has been dubbed 'four dimensional' electronic media involving real or virtual time and motion as added considerations. Broadly speaking, the visual arts may be said to include design, multimedia, communication technologies, film and television, as well as architecture and numerous traditional fields of fine art, such as painting and sculpture, and crafts like ceramics for example. While sharing a common artistic heritage, each discipline within the visual arts exhibits distinctive differences in purpose, priorities, practices, materials and techniques that cannot be satisfactorily

accounted for by deferring to broad assumptions about what is thought to motivate visual art in general or fine art in particular.

Historical, theoretical and philosophical precedents impacting on the development of design provide a frame of reference informing later discussion of design education and creativity as a higher order capability. Critical to this contextual framing in this chapter is the need to establish reasonable appreciation of the expansive and complex nature of design content, criteria and relationships. In attempting to distinguish design from other creative visual arts disciplines like painting, or scientifically oriented professions like engineering, certain underlying conflicts and stresses immediately become apparent. It is therefore useful to acknowledge a broadly postmodern perspective when scrutinising and critically unpacking various modernist influences that overtly shaped design development. The aim is to explore the intersecting similarities and expose the inherent deviations of interest and implication running parallel in art, craft and science.

In particular it is vital not to overlook the residual eighteenth century legacy handed down to the present from the Enlightenment period, because the unremitting persistence of Cartesian assumptions separating mind from body and theory from practice, have impacted design as both a practical and academic discipline. Tension and a characteristic vitality springs from the close relationship between design and technology, bridging the volatile gap between traditional notions of both art and science. As a consequence, the cultural evolution of Modernism, throughout the nineteenth and twentieth centuries, has exerted very particular pressures on twenty-first century views about the fundamental nature and relevance of design as a creative catalyst and cultural cipher in Western industrial and post-industrial societies. For example, Thackara (1988) asserts that design:

> … expressed in material form the ideas that modernism has thrown up: the progressive nature of technology, celebration of the machine, an awareness that the present is radically different from the past. Designed objects express ideas clearly. The (twentieth) century provides us with a stage play of objects charting modernism's trajectory – triumphs of the early years, exciting new products and buildings embodying the vision of a future made abundant and ordered by machines – giving way gradually to disillusion as tower blocks and concrete motorways came to symbolise our loss of control over events, and the overweening power of corporations and the state. (Thackara 1988, p. 11)

The postmodern caveat evident in this statement has changed the way design is perceived in the twenty first century. Once unproblematic, positivist dogma and historicist views of

design are now aggressively challenged. At an uncritical level design may be thought to have skirted some of the worst implications of change especially when presented as a passive process or 'neutral tool' facilitating human development and enhancing prosperity by helping to generate and disseminate new technologies, plan and (re)develop unproductive rural, urban or industrial environments, and underpin the giddy expansion of all modes of transport and communication. Thackara assesses design as having been conveniently 'disarticulated in the public mind from progress'. In which case:

> … design has managed somehow to evade blame for the negative consequences of its role in our thoroughly modern lives: the automation of production in industry, resulting in unemployment and the hollowing out of the manufacturing economy; the de-aestheticization of environments and products in the name of marketing and economic manufacture; the formation of a system of perpetual innovation which creates a superabundance of products, and mass user dissatisfaction with them, at the same time as production is unable to meet the most basic human needs in non-industrial countries. (Thackara 1988, p. 12)

Critical disquiet, fuelled by a relatively new found postmodern social self-consciousness, now impinges on any assessment of the merits and potentialities of design. By necessity it also informs this discussion of creativity as a higher order capability, such that contradictory ethical, practical and pragmatic dimensions of design practice must be admitted as core concerns. In the hands of human practitioners design is far from neutral. Social, ecological and environmental imperatives compete with economic and political priorities to dictate design opportunities and prompt or constrain design implementation. Unresolved ethical debates impinge directly on contemporary design thrusting the roles and responsibilities of the designer into ever-sharper focus. This 'bigger picture' subsumes previous instrumental descriptions of design knowledge, ideational development processes, practical design methods or skills that might once have been thought sufficient in characterising what design is. The critical judgements of the designer are most noticeable in the post industrial information age. For example where the advent of new globally influential information and digital technologies inspire ever more strident calls for design innovation, that jostles awkwardly with not only ethical but also with purely aesthetic, academic or logistical considerations.

Comparing past optimism with present scepticism indicates the extent to which design innocence was spent during the twentieth century. New age design in the twenty first century is seen as ever more fraught with irreconcilable dilemmas and decidedly less

utopian than the advocates of modernist design principles and ideals had prophesied. As Berman (1982, p.15) so acutely notes, 'To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world – and at the same time, threatens to destroy everything we have, everything we know, everything we are… To be modern is to be part of a universe in which Marx said, "all that is solid melts into air"'. A certain cynicism therefore leads some observers to consider the whole notion of what constitutes the 'modern' in design is now in very serious need of practical and philosophical rehabilitation if it is to remain useful in dealing with the challenges of an increasingly uncertain future.

In a period of heightened postmodern introspection, design struggles to resolve a myriad of basic conceptual and methodological questions. Central amongst these concerns are efforts to establish the relative importance of theory and practice in relation to the different design specialisations and especially design education, which is the focus of the next chapter. Most particularly this requires differentiating once and for all how design is thought to align (or not) with long-standing traditions and selected precedents in art, craft or science. In this respect, design is subject to fluctuating political aspirations involving creative input into changing modes of cultural as well as commercial production. Design is therefore viewed ambivalently as a harbinger, a perpetrator and a consequence of change. As such design has an increasingly vital role to play in giving shape, material form and daily direction to human affairs now and into the future.

In the late twentieth century, developments in design fields as diverse as architecture, product design and information technology for example prompted the critical (re)appraisal and ongoing attempts to (re)position design as an influential, if at times culpable, cultural determinant. Still open to question are the now unavoidable consequences that arise for example with the design, packaging and marketing of consumer goods, services and processes and the dominance of capitalist interests in world trade. Design must now address much more than just visual design elements, principles and processes. It must respond to significant internal and external accountabilities with respect to sustainable practices, beyond the innovative, the aesthetic, the utilitarian or the economic considerations. Ultimately design is being called upon to inform and educate

the buying public and equip the individual practitioner with confident, robust and self-sustaining creative philosophies and pragmatic strategies sufficient to meet the design challenges and choices of the future.

One important goal, for professionally oriented communities of design and design education practitioners, is to identify the locus of creativity within design practice in order to start overtly assuming responsibility for identifying potential areas of action and self-determination in the professional field. This depends upon clearly distinguishing design and its core concerns from the concurrent trajectories of art, craft and science. Efforts in this direction continue to drive the personal motivations, professional aspirations and academic research efforts of practitioners in maintaining design relevance and developing the necessary responsiveness within contemporary design practice and design education. While it is not possible here to deal with the history or philosophy of design in any real depth, it is important to nominally benchmark the separations, as well as the common features, that design shares with art, craft and science as sites of creative activity.

What emerges is slow realisation that professional design practice is reliant on understanding, and actively maintaining, a dynamic balance between competing motivations and interests, where the socially situated context for design outcomes must embrace cultural, commercial and functional accountabilities. Design privileges objects-in-use and the resolution of practical challenges in a visually interesting, conceptually astute and innovative manner. Meeting such obligations relies heavily on designers cultivating their creative abilities as a means of managing, successfully reconciling and concurrently satisfying the individual and societal needs of all stakeholders. At one and the same time designers are required to fulfil a myriad of roles and responsibilities that link together matters of creativity and sustainability in design to positive economic performance, productivity and prosperity for the client and the community as a whole.

To meet these demands specialist design knowledge and expertise has evolved into a variety of professional occupations that deal with a very broad range of content specific considerations. Different design occupations nevertheless share many core design philosophies, processes, practices and professional priorities; as well as training, education and academic research aspirations. From architecture, interior, industrial or

information design to graphics, fashion, furniture and landscape applications, designers share strategies for identifying possibilities, envisaging the future and actively working to resolve practical problems and, most importantly, responsibly realising creative potentialities in both conceptual and concrete output.

What is design?

Design is not an easy term to define because it is so ubiquitous and multifaceted. Meanings of 'design' vacillate between simplistic and complex, generic and specialised criteria, when used in both plain English and discipline specific discussions. The word 'design' also operates freely as noun, adjective and verb in a multiplicity of contexts. Consequently no single phrase is likely to provide an adequate depth of understanding of what design involves. One way to appreciate the difficulty and begin teasing out the underlying relevance, as well as the pragmatic meaning of design, is to compare what design has been said to represent by some of those who have previously struggled with this same definitional task. For example, in *What is a Designer: Things, Places, Messages*, Potter (1969) proffers an apparently straightforward two-way distinction between design as 'outcome' and design as 'activity' declaring that:

> Every human being is a designer. Many also earn their living by design – in every field that warrants pause, and careful consideration, between the conceiving of an action and a fashioning of the means to carry it out, and an estimation of its effects … to give form and order to the amenities of life, whether in the context of manufacture, or of place and occasion … The very clumsiness of this definition underlies the difficulty of using one word to denote a wide range of quite disparate experiences – both in the outcome of design decisions, and the activity of designing. (Potter 1969, p. 13)

By extension, Sparke (1986, p. xix) characterises design not in terms of products and processes but in relation to its meaning or communication value as a 'cultural cipher'. When defining design she argues that, 'culture has to be considered within the broad context which subsumes economics, politics and technology as … forces which have determined the dominant cultural patterns in modern society'. This characterisation of 'what design is', invites a higher order interpretation of the design message or language. Such an approach requires 'reading' the cultural importance of designed objects and practices. In terms of a 'tri-dimensional pattern' Barthes (1993, pp. 113-115) describes this as '…the signifier, the signified and the sign', where design simultaneously exists as culturally symbolic of time, place and society, as an expression of felt meaning and as a

tangible thing. However such critical analyses say remarkably little about the 'doing' of design. Adopting a quite different practitioner viewpoint, that focuses on the enacted processes of designing, Davis (1987) ventures what he considered at that time to be both a comprehensive and 'value-free' definition:

> … design is that decision making process by which humans determine, in advance of production, the forms of environments, objects and communications… akin to planning. Indeed both planning and design are attempts to manage aspects of the future …. Planning is concerned with longer time-scales, dealing with the direction and management of broader policies toward the achievement of distant goals … In contrast, design generally involves commitment to detail, for designs are intended for immediate realisation. (Davis 1987, p. vii)

Seeking to establish a coherent, future oriented and more broadly comprehensive perspective on design in *Design History Australia*, founding Director of the EcoDesign Foundation in Sydney, Dr Tony Fry (1988, pp. 15-16) resorts to coupling three different definitions from Papanek, Mayall and Sparke. Taken together these statements echo shared conviction amongst design professionals that:

> All (people) are designers. All that we do, almost all the time, is design, for design is basic to all human activity. The planning and patterning of any act towards a desired, foreseeable end constitutes the design process… Design is the conscious effort to impose meaningful order. (Papanek 1974, p. 17)

> Design conceives and defines all the means we employ to satisfy our many and increasingly intricate needs. It covers our cities, factories, hospitals, schools and houses, together with all products we use within them. It embraces the complex system that provides us with energy and materials. It spans the ways in which we transport ourselves ... It stretches over our other means of communication … It includes the instruments we use to discover more about our universe and ourselves. It extends to the artefacts … developed to express our thoughts and emotions …. (Mayall 1979, p. 9)

> Available definitions of design are varied, complex, contradictory and in a state of permanent flux. Most would agree, however, that as a cultural concept design is determined by outside forces that have shaped it and by the contexts within which it has manifested itself, as well as by the numerous faces it has presented to the world. (Sparke 1986, p. xiii)

On this premise Fry (1999) then confidently concludes:

> There are no fixed and steadfast structural relations between all the different components of design… design needs to be recognised as one of the major means by which the world in which we live (at least as members of industrial nations) is prefigured and manufactured. Design is used to order, organise, make operational, make visible, and to promote the 'modern' world. Design is essential in the economic and cultural production (the encoding) of our world as well as in its economic and cultural consumption (the decoding). These two moments are not separate poles, they are, in fact, brought together all the time... Design, therefore, is implicated in how our cultural and economic circumstances are reproduced… Design pervades the outside and inside worlds in which we live. (Fry 1999, pp. 15-17)

Having edited together a wide range of international opinions about the nature and relevance of design, in *Design Discourse: History, Theory, Criticism,* Margolin (1989) draws on the contributions of Buchanan and Dani to assert:

> Design is all around us: it infuses every object in the material world and gives form to immaterial processes such as factory production and services. Design determines the shape and height of a shoe heel, the access to computer functions through software, the mood of an office interior, special effects in films, and the structure and elegance of bridges… Buchanan … considers design to be an architectonic art that can unify other, more narrowly conceived arts and crafts: 'Design is what all forms of production for use have in common. It provides the intelligence, the thought or idea … or plan – that organises all levels of production, whether graphic design, engineering and industrial design, architecture, or the latest integrated systems found in urban planning.' Marco Dani … goes even further in his call for a science of design that can provide organisation of immaterial processes as well as material objects. (Margolin 1989, p. 3)

A decade after his earlier attempt at clarification, Fry continues to grapple with design definitions. Ultimately he settles upon three broad definitional criteria - design as object, design as agency and design as process. In *A New Design Philosophy: An Introduction to Defuturing* Fry (1999) explains:

> There are three points of focus for … understanding … design complexity: the designed object that results from the design act or process (be it a city, building, industrial product, dress, visual image or garden)… the design agency: that is the designer designing, or the designing tool created by the designer for the design act (software, a pattern, a drawing, instructions, specifications)… design as process, which is the on-going designing that is the agency of the designed object as it functions or disfunctions … all designed objects have determinate consequences … all design in process futures or defutures … Put succinctly: … we design our world, while our world designs us… Overlaid and underpinning the disposition of all elements of Design is its non-neutrality. Whatever we say Design is, it is also direction, force, power, imposition. (Fry 1999, p. 60)

What do these various definitions say about design? Such commentary, selected from seemingly inexhaustive debate on the matter, suggests that while design is an extremely flexible term used to cover many contingencies it can, at the one time, be considered as,

- action
- idea or plan
- object
- agency
- process
- organisational strategy
- mode of economic and cultural production and consumption
- power to transform the old into the new

- means of promoting (or undermining) future social, cultural or environmental potentialities as foreseeable or envisioned ends.

However this analysis remains incomplete. Taking note of the scope and depth of analysis over a considerable period of time, it is worth heeding Fry's (1988) counsel against over reliance on traditional modernist prescriptions, reductive instrumental assumptions or indeed unduly optimistic sociological definitions of design:

> Design is often placed in the sphere of the aesthetic as beauty, taste, style. It is not containable, or fully explicable, in such a construction. Neither is design definable as a particular kind of cognitive activity. One example of this, which gained considerable currency in design education, was to specify design as 'problem solving'. Where the problem came from, for whom the problem existed, how it was posed to the designer and on what criterion a solution was to be evaluated was largely outside the rhetoric of this particular pedagogy of limited perception. Neither is it possible to fully define design by reference to… types of design occupations and divisions of mental labor – such as product design(er), graphic design(er), interior design(er);…types of design objects (for instance, posters, packaging, product); or… types of design processes (such as ergonomics, visualisation, typography)… All of these observations add up to a rejection of reductivist definitions of design. (Fry 1988, p. 16)

The realisation that design is not readily containable within conveniently narrow 'applied' criteria is critical for an informed discussion of creativity as a higher order capability in design education. Hence notions of problem solving and problem-based learning are dealt with in some detail in the next and subsequent chapters. However, taking up Fry's point, and in an effort to focus more acutely on what design is or is not in a contemporary sense, it is useful to employ two heuristic strategies in the following discussion. Initially, discipline-specific design issues are concatenated or dealt with broadly from a historical perspective in relation to art, craft and science. With this understanding in place it will later become possible, through the lens of creativity, philosophy and education, to consider design as a particular form of 'praxis' - involving conscientious human action that is holistically embodied and enacted, fully cognitive, physical and emotional as well as intentionally creative. Such an approach also acknowledges the reflections of Buchanan (1995) on how best to (re)locate design 'praxis' within academe:

> … design eludes reduction and remains a surprisingly flexible activity. No single definition of design, or branches of professionalised practice such as industrial or graphic design, adequately covers the diversity of ideas and methods gathered together under the label. Indeed, the variety of research reported in conference papers, journal articles, and books suggests that design continues to expand in its meanings and connections, revealing unexpected dimensions in practice as well as understanding. This follows the trend in design thinking in the twentieth century, for we have seen design grow from a *trade activity* to a *segmented profession* to a *field for technical research* and to what now should be recognised as a new *liberal art of technological culture*. It may seem unusual to talk about design as a

liberal art…But the liberal arts are undergoing a revolutionary transformation in twentieth century culture, and design is one of the areas in which this transformation is strikingly evident. (Buchanan 1995, p. 3)

To differentiate design as a visually oriented liberal art it is useful to undertake a very cursory survey of some critical assumptions arising firstly from fine art and craft with respect to aesthetics, and secondly from the Cartesian inspired assumptions associated with science and technology. In this way, design is shown to occupy the highly contentious interdisciplinary ground between art and science, often displaying competing if not overtly conflicting allegiances. Such a positioning provides for the range, vitality and diversity needed to better understand the dynamic relationships that exist in and between different design applications. Furthermore, it also accounts for the many underlying points of pedagogical tension, and numerous other slippages of interpretation, that impinge upon design practice requiring reconciliation of aesthetic, technological, social and commercial considerations among other equally important concerns noted previously.

However, before embarking on a discussion of design in relation to art, craft or a science it is useful to first take heed of another theoretical distinction proffered by Buchanan (1995 and 2001) who argues the relevance of design as 'a theme in the philosophy of culture'. Buchanan's rhetorical approach to design as 'invention' is of particular interest later in Chapter 7, with respect to targeting creativity in design education. He asserts, with formal conviction, that design is a 'productive art' that constitutes a powerful 'new form of rhetoric in the technological age'. Employing ancient rhetorical principles Buchanan cites earlier research by Simons (1969), McKeon (1987) and others, to deftly position design within the scope of the 'New Rhetoric' as a persuasive, visual and generally non-verbal, form of communication, which has a high degree of contemporary cultural and technological relevance. In summary, Buchanan argues that:

> … a philosophically informed study of the rhetorical dimensions of design would consider the role of grammar, logic and dialectic – as well as various sciences – in shaping design as a field of practice and theoretical inquiry. Alternative arts and sciences have also received explicit attention in design studies, and their themes and devices have influenced design research and culture. From the broadest rhetorical perspective, design is a theme in the new philosophy of culture, open to new variations in theory and practice… the themes and devices of rhetoric have given greater coherence to the discipline of design, and further rhetorical studies of design will advance the discipline. Properly conceived, they may also contribute to our understanding of the philosophy of technology. Rhetorical studies of design could

help to reorient some of this work toward a new understanding of the role of human agency in shaping technological development. (Buchanan 2001, p. 203)

As if by coincidence, 'What is the New Rhetoric?' was the theme of a recent international conference in the humanities held at the University of Sydney 2-3 September 2005 (James 2005, p. 32). This confirms the academic currency of Buchanan's views about the rhetorical dimensions and persuasive power of design in relation to technology as being pertinent to this discussion of creativity and design education. Like Buchanan, conference delegates in Sydney pondered the proposition that, as a unifying discipline, rhetoric 'crosses cultures and blurs disciplinary boundaries to deliver better communication - in the classroom, in the boardroom and even in the chat room' (Thomas 2005, p. 30).

Differentiating design from art (and craft)

'Design History', as a self-determining academic field, is a very recent and still incomplete project, having arisen in the early 1970s as a quite separate concern from within art and cultural history (Margolin,1989, pp. 25-29; Dilnot, 1989, pp. 213-250). Sparke, Fry, Margolin and Buchanan cited above represent just a few key protagonists contributing to broad international efforts to conscientiously professionalise design practice and design education through research into design history, theory and criticism. The impetus for researching design history is to articulate and give credibility to the struggle of design to assert itself as an independent academic discipline within the historically dominant discourses informing art. Much has been written about the history of art, spanning human cultures from prehistory to the present day across the globe. Indeed much has been written about the philosophy of aesthetics in relation to art scholarship. Somewhere within this meta-narrative of Art and Aesthetics rests copious evidence of the concurrent and indispensable evolution of both craft and design sensibilities. Much design material is preserved as town planning, buildings and artefacts in the historic sites and cultural museums of the world, but this has only recently been subject to design-oriented study tracking innovative, technological and entrepreneurial human initiative in relation to cultural and community practice and professional development.

Explicating the difference between what might be considered to constitute art, craft and design is no easy task, however. Not the least because it often involves a radical reappraisal of the past as well as the present. The exercise is fraught with interpretive challenges because unlike art, design is inextricably linked with sometimes humble as well as far reaching political and cultural changes. For example, design is implicated in serious unforeseen social consequences, such as the occupational and demographic dislocations associated with the industrial and post-industrial revolutions. More fundamentally, the effort to differentiate between art, craft and design may seem daunting and even potentially futile because these interrelated creative endeavours differ more in purpose or primary intent than they do in observable material, technique or form.

Separating the concerns of design, from the concerns of art and craft, more often than not, is a matter of trying to determine the original, versus subsequent, emphases placed by maker, user or observer on creative products and practices - as these might relate to cultural history and theory. For instance, is an ornamental or rustic cup for drinking or for pouring libation before the gods? How much does it differ from a cup today used to drink coffee or commemorate a sporting victory? Is it a unique object (by intent or accident) or is it one of many similar items left behind or still circulating in a community? What does the cup tell us about the person who conceived and/or created it, the people who used it or the circumstances in which it was created and used? Can we be sure that we are not inappropriately projecting our own ignorance or assumptions of value or use onto an inanimate, culturally remote or overly familiar object?

Nothing much is certain. All we can really glean from the physical evidence of past works of art, craft or design is that human physical, mental and presumably psychological effort must have been focused onto the allocation of time, material and skill involved in the intentional creation of the object or scheme. One presumes that this had to have involved both conceptualisation and realisation of some vision or forward plan for the finished product. As such all art, craft and design constitute what Dewey has called 'ends-in-view', as well as representing the inherent 'means' and 'ends', as skills and products brought to fruition. In most cases however, the key to the actualisation of the product lies

in the physical 'doing' or the making, what Aristotle called 'poesis', and this clearly involves some level of human agency or the will-to-create.

Apprehending motivation is perhaps what separates art from craft from design. We can ask 'why' the artefact or scheme in question was deemed worth the effort involved in producing it. We can speculate 'how' it might have been made or used, and question perhaps 'what' caused it to be preserved (or not) by the maker, user or community within which it was created. This sort of hermeneutic approach may help to indicate what might have motivated the artist, craftsperson or designer. If for example, the aim was primarily to create something unique, inspiring, profound or beautiful for its own sake or for the sake of some loftier purpose, we may consider this art. If the overriding goal was to create or recreate something utilitarian yet refined and gratifying from traditional techniques and available materials, we may deem this craft. If the motivation was to create something innovative and culturally meaningful, with the intention of solving a problem or somehow broadly improving the human condition, we might call this design. Where an object or scheme encompasses aspects of all three considerations it is sometimes difficult to determine one priority over other motivations. In which case we are prone to focus on the more noble or grandiose justifications and call it Art. Historically such is the privileged position held, off and on since ancient times, by architecture affording this design-oriented discipline unique respect in both realms of art and science.

In a contemporary sense it might seem a little easier to identify and declare the purpose behind the creative generation of objects or schemes in our own time and culture. We can ask the creator, manufacturer, user, community spokesperson or theoretician to explain and justify factors motivating the production of particular artefacts, models, plans or processes. We can also ask them to describe in detail any specific or broad social contexts that they consider relevant. In many cases we can observe the production and distribution of the creative outcome first-hand and evaluate its 'use value' directly for ourselves using our own criteria for attributing merit or judging relevance or success in the context of our own culture. However not even these strategies are beyond dispute in a postmodern context where all discourse is treated with scepticism, remaining relative and subject to

deconstruction, always open to challenge, (re)evaluation and (re)interpretation – if not outright (re)appropriation or (re)attribution.

Therefore what designates art, craft and design in current times is generally the induction, acceptance or rejection of the creative practitioners and their works within specified 'communities of practice'. Designers and the work of designers are generally recognised to fall within the purview of design practice, as this is broadly understood, verified and agreed by contemporary design and design education practitioners. This is not to say that design does not occur outside these communities of practice. Just that design works and design practitioners are more readily identifiable if they satisfy the self-governing criteria of 'professional' design practice, which often includes prerequisite design education and qualifications. Davis (1987) remarks:

> Being human, designers are not above seeking the approval and applause of their peer group – other designers. Certainly designers would agree that it is gratifying to be responsible for a design which satisfies the client, producer and consumer. However, most designers are especially pleased with any attention, admiration and awards accorded them by their fellow designers. The consequences of design activity are often very public, so that at the risk of being seen to perpetuate some of the world's most conspicuous follies the designer has the chance of enjoying some of its greater satisfactions… Entry into design professions increasingly requires formal study. For example, some design professions, such as architecture, have been closed and may be entered only after the aspirant has won the required qualification and professional recognition … professionalisation inevitably seems to result in the upgrading of the educational prerequisites needed to practise a particular design career. (Davis 1987, p. x)

Much the same may be said for fine art practitioners such as painters and sculptors working within their own designated communities of practice. Many craftspeople seek dual recognition in the field of fine art, as well as in a discipline-specific craft domain by working as ceramists, glass workers or metalsmiths and exhibiting their 'one-off' works in art galleries and museums for example. However, acceptance into the realm of fine art for craftspeople is not automatic. This remained contentious throughout the twentieth century to the present time, notwithstanding considerable lobbying and arguments for and against craft-as-art on both sides of the debate. What is and is not art remains largely a matter for artists, art educators and art critics to determine from a secure position within the community of art practice. In passing, it is worth noting the ruminations of philosopher John Passmore, who wrote in 1950 a 'somewhat notorious' article on 'The Dreariness of Aesthetics'. In *Serious Art* Passmore (1991, pp. 19-21) turns his attention to the question 'What is Art?'. He ponders '… what kinds of human activities to describe

as 'artistic', with 'artists' as their practitioners and 'works of art' as their products – whether let us say, photography counts as art, photographers as artists and photographs as works of art…'. At which point Passmore recalls:

> William Morris once asked: 'What is an artist but a workman who is determined that whatever else happens, his work shall be excellent?' … When Morris wrote … in (nineteenth century) England, painters, sculptors, architects had largely succeeded in their fight to separate themselves from 'mere workmen', if only after a long struggle … they had managed to secure a place for themselves within a charmed circle… Morris, of course, is attacking the whole concept of a charmed circle, the primary object of which is to draw a line of demarcation between artists and those other productive workers who cannot properly be so regarded…. (Passmore 1991, p. 20)

With respect to the possibility that design might seek to be considered as art, Passmore then postulated:

> … let us say , industrial design – which has not been part of the charmed circle is clamouring for admission to it. The argument for granting admission commonly takes the following form. First it is presumed that certain kinds of activity, already forming part of the charmed circle, are indisputably artistic; secondly, it is argued that the activity now demanding admission is, in central ways in which those arts can achieve excellence, analogous to them; thirdly it is claimed that it, too, can achieve excellence in these ways… Why not say, more simply, that there is a kind of excellence peculiar to the arts and that any form of activity which can achieve this kind of excellence is an art? (Passmore 1991, p. 21)

Excellence is indeed a goal for designers, but unfortunately this is not sufficient to explain the nature of design as a particular domain of creative activity. What is worth interrogating a little further in the discussion of design in relation to art and craft, is how the philosophy of aesthetics might be seen to relate to design. This is central to understanding the difference and the increasing separation between art and design that gave rise in the twentieth century to design as a separate and distinct profession. Given that aesthetics is so often taken to be commensurate with the 'philosophy of art', it pays to approach this topic with some reserve from the perspective of design. Aesthetics clearly carries with it a heavy burden of argument and assumption about the nature of art, of artists, and of art practice, as well as of aesthetic values and appreciation of especially anything claiming to be 'fine art'. Design has a somewhat different impetus from art, and the question of aesthetics plays a contingent part in the whole design narrative.

In an essay titled 'Modernity – An Incomplete Project' Habermas (1985, pp. 3-15) provides a theoretical context for understanding the positioning of 'art for art's sake' in

isolation from everyday utility and design practice. Tracking the impetus and rationale for aesthetics from eighteenth century Enlightenment, he observes:

> Modernity revolts against the normalising functions of tradition … The idea of modernity is intimately tied to the development of European art … recalling an idea from Max Weber … cultural modernity (is) the separation of the substantive reason, expressed in religion and metaphysics into three autonomous spheres … science, morality and art … Since the 18th century, the problems inherited from these older world-views could be arranged so as to fall under specific aspects of validity: truth, normative rightness, authenticity and beauty. They could then be handled as questions of knowledge, or of justice and morality, or of taste. Scientific discourse, theories of morality, jurisprudence, and the production and criticism of art could in turn be institutionalised. Each domain of culture could be made to correspond to cultural professions in which problems could be dealt with as the concern of special experts. … As a result, the distance grows between the culture of experts and that of the larger public. What accrues to culture through specialised treatment and reflection does not immediately and necessarily become the property of everyday praxis … The category of "beauty" and the domain of beautiful objects were first constituted in the Renaissance. In the course of the 18th century, literature, the fine arts and music were institutionalised as activities independent from sacred and courtly life. Finally, around the middle of the 19th century an aestheticist conception of art emerged, which encouraged the artist to produce his work according to the distinct consciousness of art for art's sake. The autonomy of the aesthetic sphere could then become a deliberate project: the talented artist could lend authentic expression to those experiences he had in encountering his own de-centred subjectivity, detached from the constraints of routinized cognition and everyday action. (Habermas 1985, pp. 3-15)

Coincidentally by the mid-nineteenth century, industrialisation in Europe and America had already engendered mass production with a burgeoning mass market and a significant redistribution of labour, expertise and wealth. Craft traditions were aggressively being displaced by mechanised production methods, with new techniques and materials being shaped into increasing numbers of new machines and products that needed designing in advance of mass production. What is now understood as design began to emerge at precisely the historical point at which fine art 'detached' itself from everyday concerns. Sparke (1986, pp. 15-16) offers an informed historical reading of this situation to explain the rise of design sensibilities as a modern imperative:

> Although as a public concept design was absent from the picture of consumption in the second half of the nineteenth century, 'art' as applied to industry was a much-discussed and fashionable topic. There had been much debate in British Establishment circles, about the fear of foreign competition and worry, in mid-century, about the low standard of British taste and manufactured goods... It was thought that lessons from fine art would reform the British eye and museums were set up and (twelve) design schools opened in an effort to improve standards at home and hopefully, as a result on the foreign market… Toward the end of the century … Art Manufacturing consciously set out to inject art into one range of its products by commissioning a well-known artist, craftsman, or architect of the day to provide the product's artistic content …As yet the 'designer', defined as a professional as distinct from the fine artist, the architect and the craftsman, had not emerged, although new labour roles were of necessity being formulated as a result of the increased division of labour brought about by mechanisation. By the early years of the twentieth century, however, the models of production and the market … (meant) the world was ready for the emergence of twentieth century design. (Sparke 1986, pp. 15-16)

Given this history, it is not surprising that aesthetics has remarkably little to say about design. Echoing Passmore's deliberations, Korsmeyer (1998, p. 1) raises this dilemma, reiterating that one of the most basic issues of aesthetics involves questioning 'What is Art?':

> What we call 'art' includes artefacts and events produced and organised with a certain conceptual framework in mind… we also need to remember that art is an activity that produces many forms, including popular entertainment such as movies and television, pop concerts and radio broadcasts. How far ought the concept of art be extended? To clothing and fashion? Tattoos? Eating and drinking? Furniture, embroidery, the artefacts of use? The issue of the boundaries of art generates additional questions regarding the viability of a distinction between 'fine art' and 'craft', between 'high' and 'low' or 'popular' art, as well as between that which is art and that which is something else. (Korsmeyer 1998, p. 1)

While 'craft' is at least identified within this aesthetic discussion of art, 'design' is not mentioned at all. This raises the question of whether design is relegated to 'that which is something else'. A clue to understanding this omission, in terms of utilitarian aspects of the design experience rather than abstract notions of artistic 'beauty', is provided by Winters (2001, pp. 519-530) who began by asking, in the context of aesthetics, not 'What is art?' but 'What is architecture?':

> What is architecture? And in what way, peculiar to architecture, does it engender aesthetic understanding? Attempts to answer the first of these questions generally begin from the position that architecture is built form (or inhabitable space), and then add some further quality which a work must have to provide it with a status which is above and beyond mere building. So, for instance, it might be thought that symbolism is a candidate for the additional feature. Thus, Architecture is 'symbolic building' would provide a definition of architecture out of the realm of meager utility… In what way would we understand architecture, given that its works are not only symbolic … but are intrinsically part of the built environment? … How are we to take account of the fact that utilitarian considerations enter into our conception of its works? Architecture is not sculpture. That its works are designed to serve a purpose – designed to accommodate our practices of worship, work, rest and recreation – is not some accidental feature of them. Architecture … requires a conception of its works which contains utility as a substratum of the aesthetic appreciation of them… understanding can easily be accommodated within the context of a wider aesthetic theory which places emphasis on the experience of the spectator… We value architecture because of the way that we have come to experience it; and we have come to experience it as we do because of the ways in which we inhabit it… architecture is not concerned with meanings so much as with significance. (Winters 2001, pp. 519-524)

Winter's essay goes on to articulate various responses to functionalism, noting the seminal role of the German Bauhaus, dating from the late 1920s, as a training ground in the apparently anti-aesthetic modernist philosophy of 'form follows function'. This philosophy sought to negate all forms of superfluous decoration along with the notion of aesthetically 'pleasing' justifications for architectural design. Instead the Bauhaus ideal advocated implementation of new building technologies and honesty of construction

focussed on dictums such as 'fitness for purpose' and 'truth to materials'. Emphasising an idealised view of architectonic function, that increasingly moved away from hand wrought decorative or fine art considerations toward engineered and mass manufactured solutions, the Bauhaus '… sought to place architecture, not in the context of the broader arts, but in the context of economics, politics and social sciences. It aimed to replace the work of the craftsman with industrial processes … to increase housing and supersede the methods of the craft era' (Winter 2001, p. 525). Winters then draws attention to *The Aesthetics of Architecture* by Scruton (1979) as heralding what he described as a, ' … distinct area within the analytical philosophy of art', arguing:

> Here, for the first time a philosopher has considered the issues raised previously in the theory of architecture, and has sustained a position which calls upon the philosophy of mind and action and the theory of meaning … added to this is a political conception of community as a defining feature of the self … At the heart of our appreciation of the visual arts is a certain kind of experience which requires imaginative attention … This activity in which I find myself engaged, is by its very nature judgmental … Scruton places much emphasis on the fact that we are active in our appreciation of architecture; that it is not merely a passive contemplation … It is within the 'aesthetics of the everyday' … (Winters 2001, p. 527-529)

Interestingly, this discussion of mind, action, meaning, community, experience and imagination is not a commentary on 'mimesis' or the 'imitation of reality' that was first thought to be the role of art in ancient times. Neither is it an expose on the 'ideal', the 'beautiful' or the 'sublime' as motivated pre-Enlightenment theorists. It is not a description of the 'unique', the 'universal' or the 'transcendental' qualities as one might expect in idealist or even modernist inspired discussions of aesthetics. Finally it makes no reference to the importance or otherwise of 'expression' held so characteristic of fine art during the twentieth century.

Rather, this particular discussion about aesthetics in relation to architectural design skirts over apparently incidental matters of forms, materials or techniques. Instead it pivots on a number of somewhat more grounded design-oriented considerations including notions of utility and function; economics, politics and social science; industrial processes; community standards and cultural significance; along with active engagement, sensory experience, imagination, practical judgement and creativity as the 'aesthetics of the everyday'. In this important respect therefore, the pragmatic relevance of design may be distinguished from the esoteric aesthetic traditions of fine art by its overt engagement

with the needs of end users and the efforts of designers to stimulate and satisfy the desires of consumers in an exchange economy. In short, design is not necessarily motivated by idealised (or indeed reactionary/avant-garde) aesthetics circulating within fine art theory or practice. Design is little concerned with the critical opinions of aficionados of the fine art establishment. Rather design credibility is about meaningful acceptance of designers and their work within the separate community of design practitioners, ultimately substantiated by broader social respect for and popular adoption of design products in the wide cultural context of everyday use.

Before concluding this brief review of the relevance of art and aesthetics for design, it is important not to fall into the trap of oversimplifying the shifting fortunes of aesthetics in relation to modernism and postmodernism, especially in art. Recalling the analytical investigations of Lyotard (1979) in *The Postmodern Condition: A Report on Knowledge,* there is a critical examination of prevailing assumptions about the nature of science and art in relation to what constitutes socially validated knowledge. For example, as a postmodern commentator, Lyotard takes exception to Habermas's view of 'modernity'. In the process he questions Habermas's nostalgic desire to be rid of modernism as an incomplete Enlightenment project in order to return to certainty and some long lost idealised past aesthetic. As referred to earlier, Habermas focuses on a recurrent reactionary or anti-aesthetic lineage in post eighteenth century art. Within modernism, Habermas cynically describes how avant-garde artists strive in vain to assert a radical worldview by rejecting the prevailing conservative tradition, only to find that their own radicalism is soon normalised into a new esoteric tradition against which the next generation of artists react. Habermas implies that in this respect there is little of merit separating modernism and post modernism in terms of distinguishing the '… antimodernism of the 'young conservatives' from premodernism and the 'old conservatives', and from the postmodernism of the neoconservatives' (Habermas 1985, p.14).

In response Lyotard (1979, pp. 72-79) argues, 'What Habermas requires from the arts … (is) to bridge the gap between cognitive, ethical and political discourses, thus opening up the way to a unity of experience'. In terms of the question 'What is Postmodernism?',

Lyotard criticises Habermas's view of art as indicative of a regressive call to suspend creative experimentation in order to reinstate an irredeemable sense of aesthetic confidence in 'realism' and 'identity' through fine art. However given that design has forged a creative link between public policy, the market economy, technology, production and consumers via its industrial rather than elitist aesthetic affiliations, Lyotard asserts that:

> … it is possible to ascribe the dialectics of the avant-guards to the challenge posed by the realisms of industry and mass communication to painting and the narrative arts… As Thierry de Duve penetratingly observes, the modern aesthetic question is not 'What is beautiful?' but 'What can be said to be art ?'… There is no denying the dominant existence today of techno-science, that is, the massive subordination of cognitive statements to the finality of the best possible performance, which is the technological criterion. But the mechanical and the industrial, especially when they enter fields traditionally reserved for artists, are carrying with them much more than power effects. The objects and the thoughts which originate in scientific knowledge and the capitalist economy convey with them one of the rules which supports their possibility: the rule that there is no reality unless testified by a consensus between partners over certain knowledge … (Lyotard 1979, pp. 75-77)

Therefore, if design is 'that which is something else' than art, design could be said in many respects to have taken up the scientific and technological challenge that the fine arts shunned. In this analysis art is seen to favour a retreat into an increasingly esoteric modernist engagement with aesthetic issues and overtly stepping aside from the everyday imperatives of industrial, let alone post-industrial societies. This perhaps accounts for the appreciable discontinuity or gap between what is seen as design knowledge(s) and those knowledge(s) resident within a modern or postmodern interpretation of fine art or aesthetics. Nevertheless, it still remains to be seen how design might accord with or deviate from the potentially covalent considerations of science.

Differentiating design from science

Science, scientific knowledge, scientific methods and learning strategies have undoubtedly exerted extraordinary domination over human consciousness in the Western world since the eighteenth century. At this time analytic secular rationality effectively supplanted 'faith' in previous religious/spiritual authority, triggering a radical shift in power politics. 'Knowledge' was fundamentally redefined and codified. Adoption of scientific processes and disciplines promised a means by which 'objective and universal truths' could be targeted for secular investigation and thereby systematically brought under human understanding, control and use. Harnessing science to unravel the mysteries

of nature led people to believe that it is possible for all the forces and resources of the environment to be identified, managed and manipulated to human advantage in the name of 'progress'. While Copernicus, Galileo and Newton were at the forefront of the 'New Science' that launched the modernist movement, in much the same spirit Rene Descartes (1596-1650) is widely acclaimed as the 'father of modern philosophy'.

In a technological sense, scientists succeeded in making the discoveries and generating the mechanical and material innovations that underpinned the rapid spread of the industrial revolution. As a result the mercantile economies picked up momentum and influence during the nineteenth and twentieth centuries. Yet it was the mathematician and thinker Descartes that developed an autonomous and methodologically oriented 'science-minded philosophy' with a speculative focus on independent self-determination in human affairs. By marshalling his powers of personal reflection and judicious self-critiquing doubt, that is his 'subjectivity', in conjunction with the applied logic of mathematical deduction, Descartes argued and supposedly 'proved' the case for 'objective' rationality. In the process he devised 'rules' for the application of reason based on a governing notion of 'clear and distinct ideas', that still underpins much education in the twenty first century. Describing the legitimisation of knowledge in terms of science, this is what Lyotard (1979, p. 31) has called the 'right to science' suggesting that under sway of Cartesian philosophy, 'All peoples have a right to science. If the social subject is not already the subject of scientific knowledge, it is because that has been forbidden by priests and tyrants'.

The core of the Cartesian argument placed the individual human being at the centre of an intellectually oriented process equating knowledge, and indeed existence, with 'thinking'. Herein lies the genesis of 'modern cognitivism' (Winch 1998, pp. 1-20) and the pervasively disturbing legacy of Decartes that privileges mental over physical or practical activity in education. Descartes sought to separate the mind from the body, and cognition from felt experience, thus dividing rationality from emotion, in what later came to be known as 'Cartesian dualism'. Inherent in this dualism is a fundamental distrust of the senses as giving any sort of reliable access to knowledge. This is because information

derived from the senses is subjective in nature and tends to defy Decartes's laws requiring certainty, objectivity and verifiable proof.

Unfortunately, education in the Western world developed and is still largely predicated upon this privileging of intellectual over practical and experiential or applied learning. The merits of theory over practice are still promoted to such an extent that attempts to create an integrated, balanced whole-of-person approach to learning remains extremely difficult to sustain, as much in design as in any other field. According to Solomon and Higgins (1996):

> The dualism of mind and body was a product of several centuries of intellectual development, the progress of science and the newfound respect for individual autonomy. Distinguishing the mind from the body provided a realm for science, concerned with the physical world, to proceed unhampered by religion or moral concerns associated with the peculiarities of the human mind, human freedom, the human ability to 'transcend' physical reality, and so on… the new modern world … (has) to juggle two sets of concerns, one for bodies, one for the mind (one for facts, one for values). From Descartes to Sartre, getting these two together would not be nearly so important as keeping them safely apart. (Solomon & Higgins 1996, pp. 185-186)

In this context, it is difficult to construe design as a science, despite the earnest aspirations of some design practitioners and academics noted in the next chapter. The dilemma lies in the very nature of the design process as actively taking carriage of practical ideas through to the actuality of physical realisation and production. To try to divide the process by separating design theory from design practice is to do only half the designer's job and to resolve nothing substantive. Similarly, to attempt to teach design theory in the absence of, or even at the expense of, commensurate design practice is to deprive the learner of the practical insights and the means of making judgements over, and taking informed action in, practical matters. This would deny students and novice practitioners the professional capability of achieving and maintaining creative control over the production of their own design ends.

Having said this, it is important to note that deep seated differences of opinion exist within the design community regarding those design disciplines that historically, technologically or futuristically claim scientific superiority and academic alliances. These fields include architecture, engineering and industrial design, as well as newer design disciplines in the areas of information technology and digital media such as multimedia, animatronics or robotics for example. As noted earlier, cognitive research coupled with

digital and machine investigations into artificial intelligence (AI), such as those promulgated by Simon (1969) in *The Sciences of the Artificial,* have interpolated many inappropriate rationalist assumptions about the systemic nature of both creativity and design. The tension this creates in the design community manifests itself in educational contexts. Competing ideologies may result in the creatively experimental and experiential dimensions of a course of study being heavily disciplined or marginalised in favour of hard core and often more generic studies in theoretical and applied physics, mathematics, material or computer science.

In an industrial context, this is a 'chicken and egg' argument. It turns on what is considered to constitute essential and assertable design knowledge and capabilities, in an adaptable, holistic and experiential sense; compared with a quantum of foundational scientific learning that may or may not maintain currency in creatively variable circumstances over the career of the design practitioner. In very many respects however, the argument over whether design is or can ever be considered a 'science' is itself moot in a postmodern context. As Lyotard (1979) explains, this sort of conundrum invokes irreconcilable 'language games' and competing 'narratives' characteristic of an unproductive preoccupation with science versus non-science:

> What we have here is a process of deligitimation fueled by the demand for legitimation itself. The 'crisis' of scientific knowledge, signs of which have been accumulating since the end of the nineteenth century, is not born of a chance proliferation of the sciences, itself an effect of progress in technology and the expansion of capitalism. It represents, rather, an internal erosion of the legitimacy principle of knowledge. There is erosion at work inside the speculative game, and by loosening the weave of the encyclopedic net in which each science was to find its place, it eventually sets them free... The classical dividing lines between the various fields of science are thus called into question – disciplines disappear, overlappings occur at the borders between the sciences, and from these new territories are born. The speculative hierarchy of learning gives way to an immanent and, as it were, "flat" network of areas of inquiry, the respective frontiers of which are in constant flux. (Lyotard 1979, p. 39)

Therefore, rather than unnecessarily constraining design within the increasingly questionable limits of science, it seems more relevant to view design as one of the 'new territories' of inquiry to emerged out of the nineteenth century. With this conception it is possible to acknowledge and promote a wider range of design 'sensibilities' in the quest for creativity and innovation. For design, the relationship between creativity, perception and science is what Lawson (1997, p. 183) describes as a 'balancing act'. It involves equal measures of beliefs, values, attitudes, confidence and passionate commitment, with

concrete understanding of technology, material science, engineering, physics, psychology and business. This tension has been characterised by the product designer Dick Powell as '… a half-way point between artistic creation and a logical engineering approach to design' (Gardner 1989, pp.110-132).

Nevertheless in education particularly, it is wishful thinking to try and ignore the tenacious legacy of Descartes. Pedagogical schisms are still all too evident in teaching and learning practices that persistently attempt to isolate the human mind from body, separating head from hand, intellect from intuition, rationality from feeling and emotion, as well as logic from values and responsibilities. It could be argued that Cartesianism in education drove a wedge between science and the so-call 'creative arts' that is still evident in secondary, vocational and higher education curricula today. This seems unfortunate and educationally counterproductive, given the realisation that both science and art are equally reliant on creativity when it comes to discovery and innovative practice. It is particularly significant, for meaningful teaching and learning in design taken up in the next chapter, that creativity is now very widely understood to be essential in dealing effectively with ongoing social and technological change.

Throughout the twentieth century, and in part as a result of the Cartesian influence, art (and by implication design) became increasingly fractious and problematic. From a philosophical, theoretical and practical viewpoint Habermas (1985) notes the artistic, scientific and social dislocation thus:

> If I am not mistaken …more or less in the entire Western world a climate has developed that furthers capitalist modernisation processes as well as trends critical of cultural modernism. The disillusionment with the very failures of those programs that called for the negation of art and philosophy has come to serve as a pretense for conservative positions … But with the decisive confinements of science, morality and art to autonomous spheres separated from the life world and administered by experts, what remains from the project of cultural modernity is only what we would have if we were to give up the project of modernity altogether. (Habermas 1985, pp. 13-14)

Despite such rhetoric, things are never quite what they may seem especially where there remains an underlying spirit of creative anarchy and pragmatism. While espousing, and in some cases championing the intellectual and analytical tenets of modernism in the twentieth century, creative disciplines such as design fundamentally and provocatively defied scientific constraints and assumptions by holding fast to sensate and practical

engagement in studio based design activity. This is still largely the case, despite the drive toward professionalisation in design practice and the push toward economic rationalism in design education that sees practitioners and design associations covet the supposed academic legitimacy associated with embracing a 'scientific' approach to study and research.

Similarly, art history may have seemed for a time to tolerate nineteenth century Cartesian inspired theoretical categorisation well enough, until fundamentally questioned by the postmodern concern over 'historicism' and the marginalisation of 'other' historical perspectives. When the assertive analytical dimensions of modernism in art and design fell under the withering gaze of postmodern scepticism, designers simply regrouped. After some initial resistance designers soon began enthusiastically dismantling and reassessing the older ideology and historical icons so that the stylistic manifestations of modernism could in large measure be plundered, appropriated, reinvented, reinterpreted, retired or jettisoned (perhaps only for the time being). Using a theoretical as much as an architectural analogy, this was merely a matter of 'deconstructing' the old edifice of modernism and using the constituent parts to create 'new' designs, more in sympathy with 'postmodern' sensitivities. Similarly the challenge to traditional art history that had previously marginalised design, simply exposed opportunities for new areas of academic research into alternate design histories such as embarked upon by Fry and others, noted at the beginning of this chapter.

In large part, the anarchic and iterative nature of design practice evidences the fundamental creativity inherent within design. As a relatively recently emerged professional discipline, design is characterised by a peculiarly adaptive resilience and an instinct for self-preservation amongst practitioners voluntarily working at the forefront of change. Designers readily concede the less than ideal consequence of living in an increasingly precarious world where as many problems are being created as are being resolved by designers and scientists alike. Consider the dilemmas associated with the consumer-driven exploitation and squandering of natural resources, the wanton degradation of natural environments and the escalating problems of pollution or waste disposal caused by the manufacturing and planned redundancy of consumer products

typifying market economies, for example. Even where science might have once been deemed paramount in potentially solving such problems, concurrent design practices belligerently served to inject emotionally charged counterpoints intended to expose, disrupt, confound and reintroduce critical consideration into twentieth century analyses of society and culture.

As examined in more detail in the next chapter, mounting anxiety over the need to revise the cultural role and social responsibility of design has undoubtedly had an impact on educational priorities. However, in practice such awareness vies for pedagogical significance with the instrumental transmission of narrowly defined design knowledge and craft oriented technical skills. Many time-honoured teaching strategies are still more concerned with the dissemination of established information, than with the critical appraisal of consequences and the quest for creative alternatives to the status quo. This is reflected in seemingly endless debates over the relative merits and importance of promoting intellect over expertise, knowledge over skill, theory over practice, education over training. Within a modernist art making context, similar debates continue to rage around the privileging of fine art over craft, promoting the idea or concept over the making of objects designed to meet the needs of end users.

The advent of postmodernism has introduced into this equation a belated recognition that all definitions, and other so-called 'truths' about what design is or is not, are relative and situated. All that is sure is that ambiguity, contradiction, uncertainty, variability and adaptability are normal aspects of change and indeed indispensable parts of life in both the human and natural environments. With this context, the notion of creativity as a topic of qualitative educational research has become significantly more accessible. As research priorities, design and design education constitute central planks in the campaign to professionalise and elevate the status of design as a profession. Hence, questions of innovation and creativity represent special topics of interest precisely because design occupies the potentially fertile but disputed territory between art and science, located as it is between the subjective and objective realms of human endeavour.

Design understanding still teeters on the knife-edge of many refuted Cartesian assumptions. Depending on the specific design discipline, and postmodernism

notwithstanding, professional emphasis may lean more toward the objective, scientifically precise mathematics of engineering and industrial design, along with the spatial and structural formalities of architecture for example. Alternatively, design can just as readily tilt overtly back toward subjective and playful experimentation with visual ambiguity and interpretive psychology focusing on expressive image making as in graphic design and advertising, or the stylistic fancy and social provocation so typical of fashion design for example. Constant within this design dynamic is the quest for creativity that slips effortless between an accommodation of both objectivity and subjectivity, not as either/or options but rather striving to successfully integrate both aspects of the same discipline concurrently in a professional and business oriented context. Herein lies the challenge for the design educator, where Csikszentmihalyi (1996) observes:

> Each of us is born with two contradictory sets of instructions: a conservative tendency, made up of instincts for self preservation, self-aggrandizement, and saving energy, and an expansive tendency made up of instincts for exploring, for enjoying novelty and risk – the curiosity that leads to creativity belongs in this set. We need both of these programs. But whereas the first tendency requires little encouragement or support from outside to motivate behaviour, the second can wilt if it is not cultivated. If too few opportunities for curiosity are available, if too many obstacles are placed in the way of risk and exploration, the motivation to engage in creative behaviour is easily extinguished. (Csikszentmihalyi 1996, p. 11)

Design, innovation and creativity

In recent times successive Australian governments have sponsored waves of industry research and policy initiatives intended to promote design and innovation. The often-repeated goal has been to boost national efficiency and economic prosperity through improved productivity and competitive performance in domestic and global markets. At the national level significant tension is discernible between support for the arts or the sciences as the most relevant means of achieving the desired ends. For example, the mid 1990s saw the political balance shift markedly in favour of science, technology and mathematics. Outgoing Labor government support of the creative arts, as noted in *Creative Nation* (Commonwealth of Australia 1994), was eclipsed by the incoming Liberal government initiative *Backing Australia's Ability* (Commonwealth of Australia, 2001 & 2004) giving priority funding to science and technology as outlined in *Innovation: Unlocking the Future* (Miles, 2000).

Creative Nation (1994) was a very short-lived Commonwealth cultural policy that recommended a 'Charter of Cultural Rights for all Australians'. This charter aimed to give prominence, among other associated cultural considerations, to '… the right of access to education that develops individual creativity and appreciation of the creativity of others'. This policy recognised a need to encourage and nurture 'innovation', 'ideas', 'creativity' and 'excellence' on a national level by, ' … developing lively and sustainable cultural industries, including those evolving with the emergence of new technologies.' Referring to education and design, *Creative Nation* (1994) declared:

> We require a broadly based education system that focuses on a comprehensive range of educational values stressing imagination and creativity as well as skills… Design is a primary indicator of the cultural, technological, social and economic standing of any nation… design represents a significant technological and skill investment which is critical to sustaining a high quality world manufacturing industry. The Government recognises the importance of design in adding value to manufactured goods, improving export performance, developing elaborately transformed manufactures and succeeding in niche markets. (Commonwealth of Australia 1994b, pp. 14 & 82)

Various precursor events brought Australian industry, practitioners and educators together to inform the development of arts policies articulated in *Creative Nation.* For example, the National Industry Extension Service National Design Forum and the Australian Design Summit took place in May 1989 to address, '… impediments associated with the fragmentation of Australia's design capabilities, professional bodies and portfolio interests'. The subsequent Commonwealth Government white paper *Working Nation* (Commonwealth of Australia, 1994a) identified what was described as, '… an emergent view proposing the development of a new industry-focused agenda… (to) install Design in the integral role within the process of research and development, production, marketing and sales'(Freeman 1995, pp. 24-25). This was intended to set positive directions for future development of the design sector in Australia.

The Australian Academy of Design had been inaugurated in 1990 as Australia's peak body. Its intention was to provide a '… catalyst to enhance recognition and use of design within Australian industry and the community'. Amalgamated with the Australian Quality Council in 1993, the Australian Academy of Design undertook the 1994 National Design Review *Competing by Design* (Freeman, 1995). This report promoted design in terms of 'innovation' and 'competitive advantage'. It cogently argued that design is '… critical to the successful commercialisation of innovation … (as) an essential element in

the continuum of quality, continuous improvement and best practice … a critical value adding and value capturing mechanism with a crucial role to play in sustaining and expanding Australia's economic viability and international competitiveness'.

With respect to creativity, this report highlighted the Japanese disaggregation of design into four defining areas of human achievement including improving national life, creating demand and stimulating the industrial economy, creating a 'life culture' and fostering creativity. Design education in schools, vocational and higher education, was lauded as a key factor in stimulating improved design understanding and performance. However, while mentioned in passing, creativity remained implicitly buried within the design discussion and recommendations. No real attempt was made to explicate precisely 'how' creativity prefigures in design achievement with respect to innovation, design or technology education. This is symptomatic of ongoing difficulties that bedevilled many subsequent attempts to sharpen the performance of industry and education with respect to design and innovation.

The apparent lack of explicit understanding of 'how' creativity functions as a higher order capability in design and industry has become increasingly problematic. Conceptual and operational strategies, associated with the escalating demands of the 'knowledge economy', are urgently needed to deliver heightened and more reliable access to creativity. However, the ambiguous and persistently unresolved nature of what motivates and constitutes creativity in design has repeatedly forestalled successful implementation of Australian government policies despite very substantive investment in scientific research and other initiatives intended to boost innovation and foster entrepreneurship. For example, *Knowledge and Innovation: A policy statement on research and research training* (1999) openly acknowledged the critical role of creativity and design. Kemp (1999, p. 3) went so far as to declare, 'The Government appreciates that … social and technological progress of humanity is underpinned by the discovery and dissemination of knowledge, critical scrutiny of argument and evidence, creative design, clever application and an entrepreneurial culture… along with a willingness to consider alternative views…' (Kemp, 1999).

The follow-up report of the Innovation Summit Implementation Group *Innovation: Unlocking the Future* (Miles 2000), advocated the creation of an 'ideas culture' quite rightly observing that:

> Innovation thrives in a culture that is not afraid of risk-taking, promotes the value of experimenting, and rewards enterprise. We need to create the right culture to support us in our efforts to become better innovators. For example, improving our vision, attitude and strategic approach to innovation, the entrepreneurial expertise of our managers, and our graduates' skills in creativity, oral business communications and problem solving… The solutions of the past decades will not suffice in the new knowledge age … If we are to take the high road, a road of high growth based on the value of our intellectual capital, we need to stimulate, nurture and reward creativity and entrepreneurship. (Miles, 2000, p. ix)

In fact it took another five years before the issue of creativity eventually came to the fore in the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) Working Group on 'The Role of Creativity in the Innovation Economy' (McCalman, 2005). Belatedly, representatives of the humanities, arts and social sciences are now welcomed into the innovation debate. In a recent National Press Club address Gillies (2005) asserts that, 'In re-thinking Australian innovation, we need to recognise that we're dealing with a series of issues which are taking us from industrial models through knowledge models to talent models'. Asking if it is, 'ideas and technology that transfer…' he suggests that people not abstract technologies '… are the best agents… in creative economies… it is the transfer of people that gives the most efficient transfer of ideas… eventually to generate value'.

Noting, 'The Talent Economy – a new idea – is one that focuses on those people…', Gillies argues vehemently that 'talent is the new gold' declaring:

> We need to re-think education to unlock talent… in the humanities and arts and social sciences, we have nearly 65% of Australia's university students and 50% of its staff, but… less than 10% of our national spend on research and development… education is the incubator of innovation… Why is it at a time when huge skills shortages are emerging in areas of maths and science and engineering, that we still perpetuate this apartheid model in our universities with separate faculties of arts, separate faculties of science, with different funding models and often rigid walls between them? … Australia should be probing the arts and sciences connection … We need to find ways, creative ways in structural terms, and also curricula redesign, of opening up what our universities already offer, and allow students to choose how they wish to develop their talents… now (is the) time to re-visit the equation of science and innovation… With 7% growth being predicted for the creative industries, a $20 billion industry… (and) growth of nearly 15% being expected for the next five years… I personally think that the twenty-first century will be the century of design…We're seeing a huge explosion of the potential of design. A field that ties up arts, ties up engineering and ties up technology and business in an integral way… We need to make sure that we are thinking of creative people first. Not necessarily thinking of the subjects and… the disciplines that hide behind them… (Gillies 2005, pp. 1-20)

Compared to Australian government preoccupation with 'innovation' and 'entrepreneurship' in relation to science and business, the British Government adopted a somewhat different approach. Corresponding government initiatives in the United Kingdom dealt more explicitly with the notion of creativity and its relevance to design, industry and education. Emphasising the creative potential in all people at all stages of life and the educational challenge of finding ways to 'unlock' human creativity as a resource, a National Advisory Committee in Britain produced the groundbreaking report *All Our Futures: Creativity, Culture and Education* (Robinson, 1999). This research linked 'economic prosperity and social cohesion' in England with the development of a national strategy for creative and cultural education. In a political context this British initiative is especially noteworthy in its efforts to go beyond mere rhetoric to explain:

> By creative education we mean forms of education that develop young people's capacities for original ideas and action: by cultural education we mean forms of education that enable them to engage positively with the growing complexity and diversity of social values and ways of life… creativity is possible in all areas of human activity, including the arts, sciences, at work, at play and in all other areas of daily life. (Robinson 1999, pp. 5-6)

Most significantly using a holistic pedagogical perspective across the curriculum, the British Government embraced the idea that everyone has creative abilities in different ways. A range of government, industry and education initiatives were funded between 1999 and 2004 designed to put people in touch with their own creative strengths in order to promote, 'self-esteem and… overall achievement'. With commendable conviction the report on creativity and cultural education declared that genuine and meaningful creativity is more than an innate ability, an intellectual construct, a set of procedures or even a certain freedom or lack of restraint. Rather *All Our Futures: Creativity, Culture and Education* confidently asserted that creativity is overtly teachable as a combination of 'knowledge, control of materials and command of ideas' delivered in conjunction with four observable characteristics of creative processes:

> Creative education involves a balance between teaching knowledge and skills, and encouraging innovation. In these ways, creative development is directly related to cultural education… The engine of cultural change is the human capacity for creative thought and action… Creative and cultural education are not subjects in the curriculum, they are general functions of education… Teachers can be creative in their own teaching; they can also promote the creative abilities of their pupils. The roles of teachers are to recognise young people's creative capacities; and to provide the particular conditions in which they can be realised… First, they always involve thinking or behaving imaginatively. Second,

overall this imaginative activity is purposeful… (in being) directed to achieving an objective. Third, these processes must generate something original. Fourth, the outcome must be of value in relation to the objective. (Robinson 1999, pp. 6, 11 & 30)

Reporting on the resulting development of creativity in primary and secondary schools the British Office for Standards in Education (2003) prepared an evaluation titled *Expecting the Unexpected.* This surveyed 'good practice' in schools and commented on the successful policy implementation of a three year curriculum project designed to advise schools on how to promote creativity in young people. Having visited forty two British schools, it was concluded that with creativity having been given such unprecedented educational priority in England creative results were found to be generally 'good' or 'exceptionally good'. Teachers were seen to be committed to promoting creativity, demonstrating '… good subject knowledge, and a sufficiently broad range of pedagogical skills to foster creativity in all pupils, whatever their ability'. The majority of schools successful in promoting creativity were, '… outward-looking, welcoming the perspectives that external agencies and individuals bring to them, including local education authority (LEA) programmes focusing specifically on creative development and national initiatives like Creative Partnerships' with industry and the professions.

Reflective comment in this evaluation is particularly insightful for this inquiry into creativity as a higher order capability. It observed that:

> … it is not surprising to find schools wanting to talk about (creativity) – what it is, why it is important to promote it and how best to do this. However, as this report indicates, the creativity observed in children is not associated with a radical new pedagogy – though some teachers feel it might be, if only they can find what it is – but a willingness to observe, listen and work closely with children to help them develop their ideas in a purposeful way… this focused engagement with the individual pupil - even within a group situation – is common to all creative work …, and is of course common to all good teaching. Such one-to-one dialogue is not always easy to develop. It requires, for instance, the particular skills of listening, interpreting and evaluating, a higher level of subject knowledge, and time. It also needs a particular environment: one in which creativity is recognised and celebrated. (Office for Standards in Education UK 2003, p. 5)

The British research initiatives confirm that creativity is an overt and intentional activity that hinges on embodied and enacted imagination pursued within a 'generative', 'evaluative' and 'iterative' learning context. Such a description of creativity does not focus on the production of artefacts, or the performance of atomistic tasks, or compliance with prescriptive procedures as standardised techniques or the demonstration of prescribed competencies. Rather it emphasises the broad application of a complex mix of

abilities, identified as flexible and adaptive capacities. This underscores the higher order nature of creativity as a multi-factorial human capability dependent upon the confident, empowered and purposeful integration and engagement of both mind and body in learning experiences that are focused on the achievement of overtly creative outcomes.

Since1993 Britain benefited from the activities of an 'agent provocateur' in the form of a subscription organisation called *DEMOS: Putting tomorrow's ideas to work today.* DEMOS actively interrogates community and government commitment to democracy, change and creativity with respect to economic, social and education policy. DEMOS (2001), describes itself as '… an independent think tank and research institute in London … its role is to help reinvigorate public policy and political thinking and to develop radical solutions to long term problems'. Similarly, the British Design Council, '… identifies, develops and promotes the best use of design', with input from industry and government. In conjunction with the DEMOS the British Design Council established and maintained for a time a powerful interactive website called *CREATIVENET* (Williamson, 2001). This Internet site provided a proactive research portal encouraging public debate and professional information exchange on a wide range of issues and applications to do with creativity and design. This collaborative online endeavour included a newsletter, research and case studies, topical issues and questions, skills for the new economy, debates on creative business, creative education, creative policymaking and creative community involvements. There were also online forums discussing creativity and design in relation to modelling a creative curriculum, combating conservatism in teachers, querying the impact and relevance of computers, the profit drive, business and government perspectives and industry initiatives and the entrepreneurial spirit.

The Design Council also produced a free online publication titled *Changing Behaviours* in which Lucas (2001, pp. 35-41), writing as Chief Executive Officer for the UK Campaign for Learning, drew attention to what he considered to be key developments in creativity and brain research. Concluding that '… both creativity and learning are learnable', Lucas pointed to five characteristics of the brain that are potentially important for a better understanding of creativity and learning. These include the '… brain's capacity to make connections … (and) love of patterns; idea of the brain being divided

into two halves, a right and a left side; … the state of flow … (and the) concept of multiple intelligences'. These and other interrelated issues concerning design, innovation, creativity, education and teacher training are taken up in the following chapters.

This chapter very broadly established a disciplinary context for design, as a frame of reference, for further investigation into creativity as a higher order capability. In the process definitions of what design is thought to be were considered and the distinction between design and parallel disciplines of art, craft and science were briefly examined. The contestable nature of philosophical discussions of aesthetics was highlighted to forestall a tendency toward uncritically applying criteria derived from the fine arts to the forthcoming discussion of design education and creativity. In the process, a cursory analysis of aesthetics in relation to architecture provided particular insight into the experiential nature and everyday functionality of applied design as distinct from the esoteric considerations of fine art.

Attention was drawn to the prerogatives of the community of design practitioners in determining what may or may not constitute design especially in a professional context. A useful mechanism for unravelling some of the key issues complicating an appreciation of the design context drew upon different postmodern readings of the modernist heritage in design and culture. The discussion of design context culminated with a brief commentary on the different policy approaches adopted by the Australian and British governments and affiliated industry bodies to matters of innovation and entrepreneurship on the one hand and creativity and cultural education on the other.

This discussion of design context covered design practice and associated workplace, business and cultural considerations as these relate to productivity, innovation, entrepreneurship and education. Creativity is inextricably bound up with design at all these points of intersection. The international rise of design education is examined in some depth in the next chapter to explore the pedagogical importance afforded creativity in schools, vocational education and training, and higher education in relation to both design practice and teacher education. Focus shifts onto questions of *'What constitutes and characterises design education?'*, *'Why is fostering creativity deemed so important in design education?'* and *'What educational theories underpin design education?'* This

provides an opportunity to scan various research literatures and analyse the views and outcomes of selected professional education forums that link questions of design and creativity with educational theories of experiential learning, problem based learning and perplexity.

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Chapter 4:

<u>DESIGN EDUCATION</u>

The understanding of design context, established in the previous chapter, is expanded upon in relation to design education in this chapter. Key motivational characteristics and priorities of design education are traced from the late nineteenth century to the early twenty-first century to identify the pedagogical relevance of creativity in response to three questions:

- *What constitutes and characterises design education?*
- *Why is fostering creativity deemed so important in design education?*
- *What educational theories underpin design education?*

As noted previously, development of design and design education in the Western world grew out of the aesthetic and cultural tenets of Modernism, which provided a founding ideology. Aspirational modernist values and beliefs gave impetus to a growing self-consciousness and assertiveness amongst design practitioners, many of whom sought to expound their ideological beliefs by becoming prominent design educators of their day. Modernist convictions inspired a sustained collective international drive to improve occupational recognition, as well as economic and cultural status, through overt strategies intended to professionalise design practice. A key factor in this quest for design professionalisation was the trend to move design education out of vocationally oriented art schools and colleges into universities.

The turbulent cultural history of the twentieth century bears witness to a mounting desire in various countries across all design fields to forge a radically new contemporary identity for design education. The goal was to clearly distinguish design education from the traditional principles and preoccupations of fine art and craft education in schools, colleges and universities. Progressively design education shifted focus away from inhibiting aesthetic and handcraft ideologies of the past toward an increasingly pragmatic alignment with the creative challenges and commercial opportunities associated with the

machine age and the very rapid rise of alternate technologies and new materials. The future for design and design education was, and to some extent still is, seen as inherently linked to the unstoppable expansion of industrialisation and capitalist economies. This involved the proliferation of mass manufacturing, the exponential expansion of mass transport and communication systems, and burgeoning of consumer markets on a global scale.

In the process, modernism also seeded emerging design specialisations with all-too-familiar dialectical postmodern controversies. This began with commercial imperatives being pitted against cultural integrity, aesthetics and creativity. Eventually it led to a mounting sense of culpability within design education and the drive to address the increasingly critical social imperatives and environmental consequences of design activity by reconciling competing ethical responsibilities. If society is to begin mitigating against ecological degradation caused by environmental pollution for example, and start to redress very many other social and cultural ills thought to be associated with rampant consumerism, and what some call cultural imperialism, pedagogically astute and effective design education is essential. Designers must engage constructively in an holistic and embodied manner with the relentless imperatives driving economic, social and cultural change. The pedagogical challenge is to make explicit the experiential understanding of creativity that lies implicit within design practice and design education. To date design education has drawn selectively upon the educational theories of reflective practice, experiential and problem-based learning with only partial relevance for engendering creativity.

Underpinning the discussion of creativity in design education is the need for more holistic, robust and responsive pedagogical strategies, identified and established through design education, to meet cultural and community demands. This highlights the importance of design teaching and learning strategies that help identify ways in which a future orientation and a depth of self-knowledge can be overtly encouraged in teachers and students alike. Coupled with the professional conviction, and the necessary intellectual, emotional and practical capabilities, aspiring designers and design teachers

may then begin to independently marshal personal and collective creativity in the service of every design brief.

What constitutes and characterises design education?

Rather than delve into a didactic expose enumerating specialist design content knowledge, skill sets or applications, it is perhaps more productive to overview the origins and nature of design education as a whole. This highlights the broad social relevance and professional motivations underpinning design education in twenty first century Australia. It is not possible, however, to fully appreciate the dynamics presently at work in design education without some information about the educational precedents upon which Australian design education has relied for inspiration and justification. By necessity the following presents a brief historical excerpt of a much larger story of national and international design education.

Institutionalised design education is a relatively recent phenomenon, whereas education and training in fine art, craft or indeed science can be readily traced back to ancient scholarship, guilds, societies and academies of learning. Formal design education in the Western world emerged over the last century and a half amid much debate, struggling to establish an independent profile in the face of recurrent waves of industrial, social, cultural and political upheaval. According to Sparke (1996):

> The question of what constitutes an adequate training for designers destined for careers in industry and mass production, has resurfaced repeatedly throughout (the twentieth) century. The demands made on designers for industry are very different from those made, on the one hand, on the fine artist and craftsman – both of whom are expected to explore the limits of their own creative individualism – and, on the other, on the engineer who is trained primarily in technical expertise. While, designers require some of the training offered to these two groups, neither … is sufficient… (Sparke 1996, P158)

As an outgrowth of traditional fine art education, government sponsored initiatives in design education began to emerge separately to define a parallel field of creative study in the latter years of the nineteenth century. This occurred first in England, soon to be followed in America, Europe and Australia among other Western countries. Design education was a conscientious response to public outcries against the 'rude' features of early machine made goods. Design education was designated the role of bringing cultural reform, and thus quality improvement, to industry output by creatively tempering the

form, functionality and aesthetic appearance of mass produced products. By the turn of the twentieth century design education was underpinned by 'fin de siecle' social, cultural and economic aspirations very closely aligned with the drive to boost prosperity and trade performance in England as elsewhere. Struggling with a fussy Victorian and later Edwardian stylistic heritage prior to World War I, the declared aim of design education was to elevate the powers of discrimination and cultural awareness of the buying public. In a burgeoning consumer society the goal was to raise the general standard of living on the back of a rapidly expanding manufacturing sector striving to meet the escalating domestic and international demand for new consumer goods.

From the outset design education was informed by competing fine art and craft influences. Tension quickly emerged over the aesthetic qualities of decorative surface treatment and the integrity of structural form and materials. Emotive free form Romanticism vied with the geometric logic of Neoclassicism. For design, this was overlaid with a peculiar mix of functional scientific mechanics disguised behind superficial embellishments reminiscent of old handcraft traditions in textiles, wood, metal and stone for example. This was the era of John Ruskin and William Morris and heated public debates about honest labour, lost manual skills and the displacement of craftsmen by unskilled industrial factory workers.

The early decades of the new century saw the gradual demise of nineteenth century stylistic nostalgia for Victorian decoration, sentimentality and handcraft. This was rapidly superseded by a more streamlined taste for all things 'modern' especially following World War I. Design education soon adopted quite different aesthetic values and post war aspirations. In tandem with the rise of abstraction in modern art, modernist design philosophies quickly evolved into formal design elements and principles advocating simplicity, geometric form, and the minimisation of ornament and colour in the service of sleek functionalism and material authenticity. Twentieth century modernist critics like Adolf Loos for example, famously declared ornament a 'crime', while art critics such as Nikolaus Pevsner, Lewis Mumford, Herbert Read and Siegfried Giedion among others wrote treatises celebrating the 'machine aesthetic' and stridently rejecting the 'decadence' of old-world handcraft traditions (Sparke 1986, pp. xix-xxiv).

In retrospect, a more sobering realisation is that the turbulent social, cultural, philosophical and industrial dilemmas that first prompted establishment of design education more than a century ago in England still bedevil design education in Australia today with much the same creative and commercial imperatives being argued. In the mid-nineteenth century, entrepreneurial leaders in industry lobbied government to institute vocational training for industrial workers to redress labour shortages. The goal at that time was to affect a new synthesis between art and technology, from which the concept of design education emerged. For its part government was concerned to 'raise the general level of taste', as well as the quality and standard of mass-produced goods. Nineteenth century British manufacturers lamented, much as Australian employers are prone to lament now, over the lack of workers with the prerequisite mix of creative and technical skills needed to work effectively and efficiently in an industrial context to meet the needs and demands of a mass market.

In Australia today, as internationally, the call is no longer for improved aesthetic quality. Rather design is being asked by government and industry to deliver 'innovation' within the context of so-called 'creative industries'. With a narrow policy focus on promoting research in science and technology this call for 'innovation' is a clarion cry thought capable of salvaging dwindling manufacturing sectors, whilst capitalising on globalisation and international free trade market opportunities. However, innovation without creativity is nonsense, especially in a post-industrial knowledge-based economy predicated on the heightened levels of visual literacy needed to keep pace with the revolution in new communication technologies. In Australian education circles Cunningham (2001, p. 38) makes the point that '… big picture policy breakthroughs of today – innovation agendas, knowledge nations, smart states, intelligent islands and so on – are long on science-engineering-technology and short on the rest of what makes up the new economy… They haven't got the contribution of creativity right'.

Historically, educational preoccupation with traditional aspects of fine art and craft vied, throughout the twentieth century, with the need to develop alternate initiatives in specialist technical training targeting applied creativity and technological experimentation in product development. Instead what evolved was a hybrid notion of design education,

where the artistic and technical, aesthetic and commercial, priorities remain in perpetual tension perhaps never to be fully reconciled. Schools of art and design were energetically established during the latter half of the nineteenth century in all major manufacturing centres across England. The British model of materials oriented design education, typified in centres such as the Central School of Art in London, was enthusiastically emulated in America, Australia and elsewhere. America, like Britain initially focussed on fine arts training for designers, establishing the Art Institute of Chicago amongst other schools across the country. Unfortunately, this strategy failed to live up to industrial expectations. Fine art and craft studies did improve cultural awareness, visual literacy and practical competencies sufficient to produce one off functionally expressive artworks, especially in wood, ceramics, metal and fabric. However, schools of art and design failed as often as not to generate the creatively and technically astute designs tailored to mass manufacturing and commercial requirements that were so eagerly anticipated by industry. Even where new design applications proved commercially very successful, forging new industry specialisations in interior, fashion and graphic design for example, the designers themselves turned out not to be the compliant skilled labourers envisaged by the industrialists and employers. Rather designers emerged as a new breed of professional intent on independently and collectively reshaping cultural produce according to self determined criteria.

Leveraging the English experience, Europe fared somewhat better in adapting its education strategies to the new industrial imperatives. The professional development of revised art and design programs extended to well-targeted public lecture programs and resulted in some forward thinking secondary schools initiatives. In Europe the role of experienced architects-turned-educators is particularly significant in early efforts to bridge the divide between traditional art and craft and emergent design sensibilities. In Germany for example, architects such as the Belgian Henri Van de Velde working at the School of Applied Arts in Weimar, and Peter Behrens in Dusseldorf, sought to balance art and science, aesthetics and engineering.

In 1919 Walter Gropius took over from fellow architect Van de Veld in Weimar. His role was to oversee the amalgamation of the School of Applied Arts with the Academy of Fine Arts to establish the Bauhaus. This is a decisive moment in the history of design

education. Avant-garde design philosophies and creative teaching strategies at the Bauhaus quickly established it as a model institution that went on to exert a defining influence on later developments in international design education throughout the twentieth century. According to Sparke (1986, pp.159-160) the Bauhaus was the first '… thoroughgoing attempt … to rationalise the theoretical and practical implications of the transition from hand to machine production and to develop a curriculum for training designers for industry'. In particular she observes that, 'In pedagogical terms, Gropius sought to educate the individual in the language of mass production … (basing) his philosophy of design upon the craft process and saw his work as an extension of the theories of William Morris'.

With the Bauhaus the period between the two world wars in Europe marks a coming of age in design education. An independent professional identity for designers and design educators assertively comes to the fore bringing with it a clearly articulated pedagogy of design that exerts a far reaching international impact on attitudes toward the importance of creativity. At the same time it is a timely reminder of powerfully regressive tendencies that still persist within institutionalised design education that keep harking back to outdated assumptions about the relevance of esoteric fine art aesthetics and traditional hand craft techniques.

A key to understanding this ambivalent heritage is the realisation that design grew out of traditional art and craft values and techniques as they intersected, somewhat abruptly in the nineteenth century, with mechanisation and the implementation of radically new scientifically developed materials, processes, technologies and economies of scale. The architectural perspective is particularly significant in helping to reconcile the plethora of potentially contradictory design education considerations in terms of 'means', 'ends' and the self-conscious quest for an overtly 'modern', industrially secure future as the 'end in view' for Western societies.

Gropius's educational commitment linking aesthetic with social and industrial imperatives for design is declared in the 1919 Bauhaus Manifesto. By 1923 Gropius was working with prominent Expressionist painters turned teachers, such as Wassily Kandinsky and Paul Klee amongst others. This included the mystical approach advocated

by colour theorist Johannes Itten. The first five years at the German Bauhaus saw a focus on abstraction in drawing and colour. In the preliminary design course emphasis was placed on 'learning by doing' elaborated in studio based materials workshops. This was where students physically worked with wood, metal, ceramics, glass, weaving, typography and stage design under the guidance of a creative mentor supported by a specialist craftsperson who provided technical instruction and assistance. It was also a time of shifting sentiments at the Bauhaus (Sparke, 1986, p. 160). Following the replacement of Itten by Lazlo Maholy-Nagy the original elemental approach to exploring two dimensional form, colour, points, lines and planes was expanded to include more methodologically disciplined three dimensional group activities in analytical three dimensional construction and photographic experiments with light for example.

The Bauhaus moved to new purpose built studio-based design education facilities in Dessau in 1925. Here graduates like Marcel Breuer and Josef Albers focussed on the design demands of mass production. Gropius resigned in 1928 frustrated at being unable to establish architecture at the Bauhaus. In his opinion architecture represented the premier art form capable of encompassing all other design disciplines. Gropius's successor Hannes Meyer ushered in a radically different system-oriented design approach that focussed on engineering and technology at the expense of creative consideration, which was not well received. Architect Ludwig Mies van der Rohe soon replaced Meyer in 1930. As the last director of the German Bauhaus, Van de Rohe fought to engender a more balanced design philosophy that embraced creative, technological and structural considerations. It is worth noting that Gropius and Van de Rohe along with Le Corbusier are now considered three of the great designers and architects of Modernism.

In just 14 years the Bauhaus developed a formidable reputation leaving an indelible pedagogic legacy in Western design education. This legacy may have been periodically challenged but it has never been entirely eclipsed. The success and influence of the Bauhaus may be attributed to the fact that it, '… courageously accepted the machine as an instrument worthy of the artist'. By addressing itself to developing quality design for mass production it claimed to have, ' …bridged the gap between the artist and the

industrial system … (and) broke(n) down the hierarchy which had divided the 'fine' from the 'applied' arts' (Moholy-Nagy 1965, p. 63).

Rhetoric aside, the Bauhaus did preside over a very rapid transformation of design education. By the mid twentieth century design education had shed its subservience to outdated fine art and craft affiliations. Instead design education secured an ongoing relevance by actively realigning itself with the vicissitudes of technological change. Design and designers emerged as driving forces determining the standards, styles and tastes in visual and material mass culture, in Europe and across the Western world. The impetus of modernist Bauhaus values and vision in design and design education is still discernible. This is in no small measure due to the self-awareness, collective will and ideological intent of the key protagonists who conscientiously continued to promote the Bauhaus ideals and teaching strategies long after the institution, was forcibly closed by the Nazis in 1933.

Ongoing Bauhaus influence was promulgated through prolific publication in the latter half of the twentieth century. Many Bauhaus inspired texts are very highly prized and remain in print more than fifty years after they were first published. Such publications exist as enduring, creatively oriented touchstones of theoretical and applied knowledge reaching into the future, against which contemporary design practice and design education have reacted and continue to be compared and critically assessed. Such a conscious strategy for overtly shaping history through the advocacy of privileged ideals is what Bourdieu (1979, pp. 250-251) and Lyotard (1979, pp. 9 & 60) among others characterise in terms of 'games' theory. The Bauhaus philosophy, espoused in print and enacted in subsequent institutional contexts, persists long after the institutional demise of the original Bauhaus in Germany. This demonstrates a powerful interplay of many modernist assertions about the nature and relevance of contemporary design and the sorts of creative ideals and practices that continue to impinge on design education in the twenty first century.

By acknowledging that Bauhaus assertions about the meaning and value of design and design education remain 'in play', a postmodern perspective helps to bring the Bauhaus publications, and those many publications about the Bauhaus that came after, into focus

as 'moves' in an ongoing cultural game. These 'moves' are informed by modernist assertions that leverage the power of ideas and the longevity of the written and spoken word. This realisation directly links the pedagogical principles underpinning design education in Europe in 1933 with the present situation in Australia. It also informs many of the pre-understandings implicit in this discussion of creativity as a higher order capability.

The untimely closure of the Bauhaus in Germany, triggered an exodus of design expertise from Europe with many key figures migrating to America. Gropius went to Harvard University in 1937 as Professor of Architecture. In the same year he recommended Maholy-Nagy as the founding director of the New Bauhaus: American School of Design in Chicago. This embryonic institution in Chicago was quickly revamped in 1939 and renamed under Moholy-Nagy's independent leadership as the School of Design in Chicago. In 1944 it became the Institute of Design and was amalgamated as a department of the Illinois Institute of Technology in 1949 where it remains. Mies van der Rohe also went to Chicago to work as an architect, later joining the Illinois Institute of Technology.

In terms of carrying the educational experiment of the Bauhaus forward, Maholy-Nagy was a highly charismatic and influential visionary in transatlantic design education. In some ways he epitomises the tempestuous struggle to assert the prerogatives of individual and collective creativity in design over educational administration and industrial determinism. Moholy-Nagy's story emphasises the pragmatic and pedagogic importance afforded creativity in design education. Gropius described Moholy-Nagy's contribution as having provided the world renowned German Bauhaus with its most 'passionate stimulus' in terms of its goal to create a, '… union of art and life'. Moholy-Nagy's vision for the New Bauhaus in Chicago exceeded that of the original Bauhaus. Maholy-Nagy declared an even more overt design orientation in educating students, '… for the real necessities of life, and not only 'industrial designers' for the daily routine… not only aesthetically, but morally, we must control the application of our materials, technique, science and art in creating for human needs' (Fiedler & Feierabend 1999, pp. 14 & 67).

In this context it is perhaps not so surprising that, during the troubled years of World War II, Moholy-Nagy approached the retired John Dewey in New York in 1938 to discuss

matters of creative education. Dewey presented Moholy-Nagy with a first edition of his new book *Experience and Education*. Since Dewey's *Art as Experience* was already in use as a compulsory text for the product design workshop in Chicago, Findeli (1995, pp. 38-39) reasonably concludes that, 'Moholy-Nagy found in Dewey's work the theoretical foundation and justification for his own pedagogy …(where) education is the art of conceiving situation sets susceptible to promote the growth of personality, that is, the art of proposing a meaningful "continuum of experience"'.

In addition to Dewey's influence, Moholy-Nagy's experiential pedagogy was informed by various other educational theories including the Montessori teaching strategies promoting play, exploration and emotional engagement. In his book *Vision in Motion*, which still features prominently in the library collections of institutions offering design education in Australia and across the world, Moholy-Nagy (1965) presented design not as 'a profession but an attitude' where life, learning and experience are indivisible. Significantly for this study into creativity as a higher order capability, Moholy-Nagy argued that people are, '… the sum total of (their) psychophysical, intellectual, and emotional potentialities' and that knowledge can be 'felt' by those trained in both spheres of reason and emotion. Moholy-Nagy talked of design in terms of a whole-of-life 'sociobiological synthesis' involving visual, non-verbal sensory experiences, creative research and experimentation. He sought to stimulate, understand and manage the sensate nature of design experience in relation to emotional, as well as intellectual and practical considerations in design and education practices. Applied in studio or workshop situations this strategy involves building a collaborative educational relationship between students and teacher, discussed at some length in the following chapters. In this context, creativity is well understood to flourish where educational relationships encourage individual learners to explore, grow and develop design sensibilities and decision-making capacities in a challenging and supportive group learning situation.

Believing that creativity risks being eclipsed by over preoccupation with industrial processes and technicist logic Moholy-Nagy (1965, pp. 7-32) believed in 'design for life'. His goal was to, '… add to our intellectual literacy an emotional literacy, an education of the senses, the ability to articulate… (and balance the) performance of intellect and

feeling'. Holistically, design education therefore values opportunities to balance subjective and embodied sensory, emotional and lived experiences with the more objective intellectual, technological, social, cultural and environmental considerations that together constitute a purposeful education for life. According to Moholy-Nagy the best strategy for achieving creative engagement with the world is through 'learning by doing' as advocated by Dewey. In his view and the view of the design educators who came after him, the best context for design education is the collaborative environment of a practical workshop or design studio.

In large measure this remains the dominant model for delivery of design education in institutional settings around the world. Sibyl Moholy-Nagy (1950) records, in her husband's biography, the zeal with which Moholy-Nagy espoused a creative pedagogical philosophy for the New Bauhaus in Chicago in 1937 that:

> … defined the teacher as the all-important bridge between specialist and student, the pivot of social evolution. His much-quoted phrase 'everyone is talented', acquired new meaning through a colourful demonstration of man's natural urge to exercise his senses…Many of the (student) exercises done during the first year of the New Bauhaus are still standard … material today wherever the workshop method in art education is described… The ultimate end of their semantic approach was an equation of human thinking and acting, just as the Bauhaus aimed at an equation of function and design. (Moholy-Nagy 1950, pp. 148 & 152-153)

In a prophetic heralding of the postmodern dilemma facing late twentieth century design education, Moholy-Nagy declared in a 1938 circular announcing the objectives of his 'cultural centre for integrated knowledge':

> There is an urgent necessity to create a collaboration … to restore the basic unity of all human experience which could restore the balance of our lives…When we design we must relate technical inventions and scientific discoveries to our psychological and physiological needs with a view to social implications which go far beyond mere innovation or increased financial returns. The structure, texture, durability and workability of materials must be systematised and their aesthetic and technological meaning investigated. A hundred facts of life – work, recreation and leisure, group response and personality growth – must be related to designed environment…the designers of man's physical environment (must be made) conscious of the effect of their actions on the whole of mankind. Scientists who are responsible for plastic materials and new processes, artists who influence man's emotions through colour, tone, and word, craftsmen who have explored the nature of man's basic materials: wood, stone, and metal, and finally designers who shape the tools of everyday living, must be brought together … to exchange findings and remind each other of the human denominator. (Moholy-Nagy 1950, pp. 154-155)

Notwithstanding postmodern criticism of its socialist impetus and the overly confident determinism of its modernist aspirations, which were never fully realised, the Bauhaus

influence carried with it certain educational ideals from war ravaged Europe to the rest of the Western world. In England, America and Australia many of the creative theories, aesthetic values, educational principles, textbooks and teaching practices developed and promulgated by people like Moholy-Nagy continue to influence, either implicitly or explicitly, current design education beliefs and practices. The studio-based model of design education, still prevalent in Australian vocational and higher education, owes an enormous debt to the European Bauhaus tradition and its pedagogical principles and practices. It provides not only a point of critical reflection, but also a pedagogical model underpinned by well-articulated theories of creative engagement that were developed specifically to support design and design education practices.

Other post World Ward II international experiments in design education after the Bauhaus were also influential. For example in Ulm West Germany, the Hochschule fur Gestaltung was established in 1951 to focus on a more rational and theoretically rigorous training for the designer. Creativity and problem solving were afforded less importance than attending to the broad social role of the designer in cultural production and communication. Functional mathematics, sociology, cultural history, economics, political economy, psychology and ergonomics were seen as important areas of learning in departments of building, industrial design, visual communication and information. However, escalating criticism over the culpability of design in the unbridled expansion of capitalism, and disputes over the relevance of scientific method in design processes, precipitated the eventual closure of this school in 1968 (Sparke 1986, pp. 167-168).

Having changed remarkably little in its emphasis on craft training principles since the early twentieth century, the Royal College of Art in London remained relatively untouched by the evolving needs and demands of industry. Technological developments, cultural upheavals and political radicalism experienced in design education elsewhere seem to have had little impact. In the mid 1950s the Royal College of Art was reorganised into six separate schools that continue to offer materials-based study followed by a period of workplace experience. This reflects the essentially vocational nature of British design education that is still evident, notwithstanding the award of Bachelor degrees to students of design from the 1960s to the present day.

Over the course of the twentieth century design education has become a contested arena where allegiances tend to swing between two extremes. There is a persistent vocationalism in design education that is prone to default back to an elitist focus on hand production for one-off exhibition works, which values and seeks to preserve many fine art and material based craft traditions. Pitted against this tendency is a strident desire for professionalism in the design specialisations amongst those design practitioners keen to operate at the forefront of technology in a commercial context producing manufactured goods and services for the mass market. The middle ground represents a confusion of purpose cluttered with an often incompatible amalgam of old and new technology knowledge, redundant or radical practical skills and contradictory aesthetic, cultural and commercial aspirations. Since Australian design education has more in common with the British than the European or American models, design education in Australia coexists in both vocational and higher education sectors. As a result perceptions and practices in Australian design education vacillate between what Sparke (1986, p. 172) describes as, '… the two poles of utopianism and vocationalism, unsure ultimately of its aims. It is a dichotomy which is still in evidence … and there are few signs of a solution to the dilemma that it presents to the design educationalist'.

At this point it is reasonable to reflect on how this predicament is manifest in Australian design education. To assist in co-locating creative capability in terms of design attitudes, embodied holistic learning and innovative competency in Australia, an Iterative Model of Professional Design Education was developed and is provided in Appendix 2. In Australia as elsewhere, professional design education is equally reliant on creative capability and pragmatic design competencies that are implemented through the application of conceptually, socially and commercially situated design practices. When aligned with the Australian Qualification Framework (AQF), the Iterative Model of Professional Design Education helps to identify key design considerations for secondary, vocational and higher education at a number of interdependent levels.

At the school and vocational levels for example design education tends to give priority to the acquisition of applied practical competencies. This involves developing increasing skills and expertise with both general and specialised design materials, processes and

practices. Such expertise is reliant on the concurrent development of ever more sophisticated applied technical competencies in the progressive refinement of discipline specific design knowledge and sensibilities. At the higher education level particular emphasis is placed on design theory in relation to philosophical and analytical competency, and design context predicated upon heightened social and cultural awareness and integrated design applications in business and commercial matters. However, in isolation the various pragmatic vocational and/or higher education priorities prove inadequate in achieving design tasks if the skills and technical knowledge are not also informed by higher order creativity focussed on the innovative resolution of particular design considerations using discriminating judgmental abilities.

Professional capability in commercial design practice is complex because it is reliant on the versatile combination of a wide range of professional attributes. Designers need holistic 'know how' informed by practical judgement that is coupled with highly specialised technical knowledge and the making skills required to produce tangible outcomes as prototypes or finished products. Manual, technical and conceptual expertise provides no more than a platform underpinning more sophisticated capabilities. Overall, designers need to know that their critical judgements are relevant. They need to successfully reconcile a myriad of open ended questions to do with why, where, when, for what purpose and at what cost various design solutions can meet the commercial production requirements of individual clients. At the same time designers must satisfy differing aspirational and pragmatic needs of end-users within particular social, cultural, commercial and technological contexts. To be truly innovative, design outcomes must capture and sustain the imagination of other people if they are to enter local or global distribution channels and succeed in the marketplace. For this there needs to be some reliable measure of creativity built into the outcomes to differentiate and add value to the designer's work in highly competitive consumer economies. At the heart of creative capability are qualitatively rich and varied design values and attitudes that fuel holistic and fully embodied practitioner engagement with the potentiality that is redolent within each and every design project. The primary function of design education is to induct learners into this challenging professional role by stimulating higher order holistic engagement with the work of design whilst cultivating the essential creative values and

attitudes along side the necessary pragmatic technical competencies, philosophical theories and cognitive abilities.

Why is fostering creativity deemed so important in design education?

Creativity is a recurrent theme in design education in Australia and elsewhere at secondary, vocational and higher education levels. To better understand why creativity is deemed so important in design education, especially in socio-political contexts, it is useful to review the reports of pertinent gatherings and research initiatives leading up to the present. This review demonstrates both implicit and explicit political and professional awareness of creativity as a vital matter of concern for design and education, without ever quite resolving how creativity may be best explicated and integrated into mainstream educational delivery. Even a cursory analysis shows how discussion of generic skills, entrepreneurship and innovation deflects attention away from creativity as a core concern. This is symptomatic of a prolonged struggle to address creativity overtly in educational policies, teaching practices and the learning outcomes in schools, vocational education and training institutions, in workplaces, and in higher education contexts. Despite very considerable investment and research effort creativity remains in urgent need of deeper pedagogical analysis.

The 1970s saw the culmination of a post World War II boom of interest and expansion in creative education. This coincided with the emergence of design as an identifiable subset within creative arts education. As such this period and its aftermath occasioned the periodic coming together of interested stakeholders and the commissioning of much relevant educational research. Among other considerations, these activities focus on the role of design and creativity in education at all levels. Input was invited from school, vocational and higher education sectors as well as industry, community and government perspectives. Such consultative practices continue up to the present time. In 1972 for example, the Centre for the Study of Teaching at La Trobe University in Victoria hosted a weeklong congress on *Creativity and Education* for one hundred and twenty Australian and international delegates. A second congress followed in 1974. While not restricted to design, these events evidence the depth of interest in and sustained commitment to

creativity as an educational issue in Australia. Lett (1975), explains the underlying purpose of the educational congress as providing an opportunity to question:

> … what is the creative process? Hopefully, this may encourage teachers to broach the further question: how should I behave so as to facilitate creative activity in students? … to encourage creative rather than passive learning. For too many students, contact with other people's creativity involves only memorisation or criticism. For far too few is there any opportunity to attempt to be creative or to work under conditions that would encourage it. (Lett 1975, p. vi)

Key considerations to emerge from events such as these characterise creativity in terms of experience, task action, imagination, ordered meaning and communication, perseverance, immersion, struggle, and the role of novelty in the conscientious quest for something made new. Drawing on the 'commonalities' of creative motivation and method articulated by congress presenters, creativity was defined at that time as:

> … an experience in discovery … in which clarification, rethinking, insights and problem-solving occur in a complex process giving opportunity for the imagination to range over experience and re-order it … opportunity for thought and illumination is possible only while perseverance at the task continues… three characteristics … lead to creative output: the imaginative capacity to think through visual imagery; the ability to establish an ordered connectedness in conveying meaning; and the ability to relate to and communicate with others … (Lett 1975, pp. vii)

Given the demanding and complex nature of creativity, congress participants discussed issues of 'inventive and executive creativity' where inventiveness was equated with a capacity to 'break up habit patterns and regular schedules'. By comparison executive creativity was said to require heightened levels of application and concentration associated with establishing disciplined creative work practices that remain flexible and open to ongoing experience. Productivity was then thought to result from the tension between conceptual freedom tempered by pragmatic self-discipline at the intersection '…of opposed frames of reference meshing together and producing something new'. From an educational perspective such insights, drawn from a wide variety of creative disciplines including art, music and poetry, suggest that creativity first requires a willing immersion of practitioners, teachers and learners in some exploratory felt experience followed by a concerted interpretive effort to make that experience meaningful. The creative urge is then to effectively communicate this experience in an ordered and intelligible way so that the 'delight' of the new experience is made accessible for others.

Australian initiatives parallel similar events elsewhere such as a 1976 conference on *Design Education in Craft and Technology* convened by the Institute of Craft Education at Nene College Northampton, England for members involved in '… the creative, technical and practical areas of schools and colleges'. Noting a shift in the nomenclature over time with respect to naming practical education in schools, Willmore (1976) observes that what was once called 'manual instruction' became 'handicraft' or 'craft education' only to be re-badged as 'design education'. This signalled:

> … an expansion of the work of the traditional crafts with incursions into art on the one hand, into science on the other, and with overtones of social environmental studies. The trend… towards design as an integrating theme is influenced by … The emergence of technology as a school subject … new teaching methods and strategies, and contemporary school building designs offering a wider variety of facilities and equipment for manipulating materials… Such considerations, together with the needs of pupils in a changing society, have extended the boundaries and underlying philosophy of the practical aspects of school education. At a time when the whole area is in a state of flux, it is appropriate that an attempt be made to synthesise experienced opinion and to objectively consider the aims and implications of design education. (Willmore 1976, p. 5)

At this conference Aylward (1976, pp.10-16) advocates an expanded scope for design education in secondary schools beyond the simplistic notion of texture, colour or form selection in making hypothetical decisions about the re-styling of pre-existing products. Rather, he asserts the more fundamental need for high school students to learn to 'act as designers… (in) humanising technology… making sure that whatever is manufactured is most acceptable and satisfying ... The more one thinks of this the more important and central to society becomes the contribution of the designer'. Aylward (1972) was also an influential spokesperson for the Royal College of Art Steering Committee researching 'Design in General Education'. This research reviewed English design education in the context of interdisciplinary studies as a critical means by which individuals learn to adapt and respond effectively to escalating changes in society. Aylward vehemently argues that every person must be made sensitive to, and responsible for, their 'material surroundings'. Hence an understanding of design in education is argued to be essential for all citizens to function effectively in contemporary society. This proposition is justified as a necessary teaching response to the challenges presented by the unrelenting pace of technological, cultural, social and economic change. Most interestingly with respect to creativity Aylward (1976) defines the activity of designing as a corollary of learning:

> The idea of a 'design line' whereby decision follows decision with ruthless logic is now known to be inaccurate. Feed-back, circular thinking, even mosaic thinking were shown to be engaged in by practising designers so that it proved extremely difficult to set down any model on which the process could be based. Then two separate pieces of research intersected and… it became apparent that the designing process is very similar to the learning process… Designing is, above all, the activity that uses and unites both feeling and thinking. A successful designer must have a feeling for qualities and a sound knowledge of the scientific thinking on which production and economics are based. Hence designing is an excellent way of bridging the gap and encouraging pupils, naturally, to use both sensitivity and intelligence in making decisions… These arguments for considering design education as an essential element in general education seem to me compelling … (design) activity is an ideal medium through which pupils can be helped to a broad understanding of their own society and environment. (Aylward 1976, pp. 14-15)

Not so surprisingly Aylward's observations about general education in England in the 1970s echoed what Moholy-Nagy (1965) so optimistically had called in 1947 'a cultural task' in post compulsory design education whereby students:

> …(are) imbued with the artistically neglected substance of the machine age, mass production, materials, techniques, structures and shapes which conditions (them) to … resolve … design problems around the social complexes and need of (humanity). Such an education – the integration of art, science and technology – leads (them) to a simultaneous acuity of experiences, verbal and nonverbal expressions. It stabilises ... virtues, sublimates ... faults or asocial tendencies. It makes (them) inventive, resourceful, and conscious of ... (their) creative power. From that time on, learning and critical evaluation of the forces around (them) become part of (their) very existence. (Moholy-Nagy 1965, pp. 70-71)

This congruity of opinion evidences an ongoing conceptual and pragmatic struggle that unites design educators in schools, colleges and universities across the world. On a practical level the challenge in design education has long been to reconcile the pedagogical priorities and procedures, with the instrumental processes, knowledge and skill development needed to realise creative ideas into tangible design products. On another theoretical level it is equally important to attend to sustaining the social and technological relevance of design in a broad cultural context. However, all this design knowledge and skill development will inevitably fall short of the desired pedagogical outcome unless teachers actively acknowledge and promote the overarching personal necessity of creativity in terms of embodied experience. Individual students can only learn how to 'do' design as an enacted and creatively motivated response to changing opportunities in learning and life.

At the professional level too Maldonado (1965, pp. 122-134) marks this important connection between post Bauhaus design philosophies and the wider social, cultural and technological impetus driving design education in the late twentieth century to assert that,

'Education for design is education for responsible creativity'. Contemplating increased interest in design education and training issues, as 'the leitmotif of so many congresses and symposiums', Maldonado pondered the question, 'Why do … professional industrial designers… the majority of whom are so indifferent to the world of education, suddenly appear to be preoccupied with the pedagogical problem?' He concludes, '… one possible reason… is the fact that many industrial designers hope to find in education one of the most efficient means to stabilise and consolidate their profession'. Like those commentators who came before and after, Maldonado is here acknowledging the fundamental importance of creativity by suggesting an 'educational philosophy of industrial design' should prepare the designer:

> …neither as spectator nor as judge, but as an active participant in the reality in which he(she) acts and lives … dedicated to the task of equipping the world, but never to the extreme of ignoring or being indifferent to the conflicts, the calamities and the risks of the world… (the) designer will have to possess the knowledge and experience which are prerequisites for productive work in a society that is becoming every day more technicalised and where science plays from day to day a more decisive role... (the) designer will know what is necessary concerning the cultural value of the objects, their meaning for individuals … in relation to other individuals… (But) knowledge … and … experience, nevertheless, should not impede but promote … freshness and creative spontaneity. (Maldonado 1965, p. 134)

Historically creativity has long been recognised as an essential component of not only specialist design education in colleges and universities, but in general school education as well. Yet considerable uncertainty still persists about assigning relative priority to creativity and determining how creativity might be better understood and reliably targeted in educational delivery. In subsequent decades, recurrent professional and indeed overt government attempts have been made to try and come to terms with design and design education. At different times during the 1980s and 1990s efforts were made to unpack the pedagogical role of creativity at the individual, community, national and international levels. In the process issues of design, innovation and enterprise came to the fore. Differing perceptions of teaching and learning fuel ongoing debates concerning the relative merits of 'competency' versus 'capability' as appropriate outcomes of design education. Methods of vocationally prescribed training face stiff criticism from those who advocate more liberal and holistic approaches to design learning in both secondary and higher education.

Since the 1970s design education in Australia, like all education, has been subject to significant waves of ideological, pedagogical and structural change imposed at the system, institutional and curriculum levels. This has seen a separation and ongoing shifting of Federal and State Government agendas with respect to general, vocational, academic and research priorities in compulsory school education, post-compulsory industry training and academic preparation in professional undergraduate and postgraduate education. Design exists as method, content knowledge, specialist courses, academic awards, departments and faculties in all these contexts. As such, it is safe to suggest that traditional studio based patterns of design education have persisted under considerable duress. Faculties, departments, programs of study and curricula have reluctantly but progressively been modified in response to demands for enhanced design professionalisation and the introduction of new technologies, with a ever increasing competition for teaching and learning resources and the imposition of enforced logistical efficiencies, especially notable in post secondary education.

Nevertheless design education continues to privilege practical studio or workshop delivery modes. Such programs often focus on design processes and practices, the cultivation of visualisation skills, implementation of conceptual problem solving strategies on applied projects and the production of portfolio work. Visual and material research is still important, as are varying degrees of hand skills, complemented by a mounting emphasis on theoretical research and applied knowledge where technical and computing expertise is tempered by a growing awareness of social responsibility and the necessity for ecological sustainability in design. Always implicit in this heritage is an implicit commitment to encouraging creativity as being qualitatively important in design education, even where it has proved difficult to articulate exactly 'what' creativity is or 'how' it can or should relate to teaching and learning in particular contexts.

In Australia, the first national *Design Education Seminar* was convened 16 July 1987 as part of research and planning for the 1988 - 1990 triennium. Stakeholders gathered in Canberra to consider a report on *The Responsiveness of Tertiary Education to the Design Needs of Australia* (Davis & Broadbent, 1987). With the notable exception of engineering and architecture, all other fields of design were included in this review, advocating the

need to provide both professional 'education for design' practice and 'education about design' to inform the broader community. The declared focus was on improving the 'efficiency, quality and relevance of educational provision'. Notice was given that future Federal funding was to be severely restricted. Ramsey (1987) announced far-reaching policy and expenditure recommendations for the three sectors of tertiary education in Australia at that time, including Technical and Further Education (TAFE), Colleges of Advanced Education (CAE) and Universities declaring:

> It seems that now, after a history of being scattered, uncoordinated and largely unrecognised, design education is receiving some overdue attention and recognition. It is poised to achieve an identity and to attract some earmarked resources for development and growth. It has been observed that during the past decade (1970s – 80s) the Australian tertiary education system experienced an explosive growth in courses and enrolments in the creative and performing arts … Education authorities will be required to exercise some intelligent selectivity in deciding which initiatives are the most deserving of support in the interests of the best design education. (Ramsey 1987, p. 9)

These comments were indeed ominous, especially in light of subsequent structural upheavals in Australian post secondary education. The late 1980s saw Colleges of Advanced Education disbanded and subsumed within universities. The National Training Reform Agenda was implemented in vocational education and training throughout the 1990s, involving mandatory imposition of competency based training principles. From 1995 onward this resulted in specialist curricula progressively being superseded by government funded industry developed Training Packages. In the name of 'national consistency', homogenisation of vocational education and training continues unabated to the present day, underpinning a trend toward increasingly centralised and narrowly deterministic Federal Government agendas across both school and higher education.

It is significant that virtually no mention was made of creativity in the Davis and Broadbent (1987) report on the future of design education in Australia. The 'best' design education was interpreted by successive governments and bureaucratic instrumentalities to mean design education that most efficiently meet industry, employer and workforce demands. At the policy level the needs or best interests of individuals, communities or environments receded into the background. This is still largely the case for design education in schools, vocational and higher education across Australia, notwithstanding ongoing concern for sustainability. As such, Swann (2000) asserts that there is an increasingly urgent need to 'reinvent design education in the university' based on rising

research interest in professional practice-based design, which demonstrates a growing intellectual and ethical commitment to theoretical engagement and academic rigour.

Swann reflects on the longer-term pedagogical implications of 'vocationalism' in higher education where nineteenth century vestiges of old art school beliefs and atelier practices linger in university design education. This includes nostalgia for, and over reliance upon, the ' … special relationship between tutor and student where a kind of osmosis occurred as the master craftsman passed on knowledge and skills through a series of practical exercises'. Swann argues that the economic rationalism that motivated a metamorphosis of art schools into technical colleges, and colleges of advanced education into university faculties of design, failed to occasion the requisite, '…ideological shift in the concept of the nature of design education in the university'. Asserting that 'redesigning the delivery of programs is not the same as rethinking philosophy of content', Swann observes:

> In reality, there is little to differentiate between the university and the Australian TAFE … (design) programs. Selection of suitable entrants is identical through the primary importance of a folio examination. Both programs concentrate on practical projects aimed at developing skills and vocational knowledge appropriate to graduates to enter the design professions as junior designers. Both arenas have become entirely dependent on skills for computer applications and the production of simulated commercial projects. Both sets of graduates compete for the same jobs in the design profession. We have two sectors … doing the same thing… Design lecturers have been quick to extol the virtues of learning by doing. However, used ad infinitum as a practical, skills-based series of exercises, it can be argued that it has had little to contribute to the intellectual development in understanding the process of design. (Swann 2000, p. 2)

Advocating a 'post-art school' revision of design education in the university sector, Swann proposes 'breaking free of the prevailing mindsets'. He calls for a paradigm shift in design education with, 'Emphasis on …theoretical frameworks and critical, creative thinking for its own sake – albeit located in design – rather than a practical design program where understanding of theory is merely implicit'.

In the vocational education and training (VET) sector, a considerable Federal Government investment in adopting competency based training has judiciously skirted the issue of creativity, acknowledging its importance but unwilling or unable to provide either pedagogical insight or operational guidance. This is evinced in the reservedness of the Meyer report *Key Competencies: Putting General Education to Work* (Meyer, 1992), where creativity is merely inferred with respect to problem solving, critical thinking and the implementation of a non-routine or creative approach (Jackson & Doyle, 1996, p.

112). Creativity as a designated competency steadfastly remains outside the parameters of the Key Competencies because according to Jackson and Doyle (1996, p. 28), although the phenomenon was acknowledged by the committee as implicitly important, it proved too complex and problematic to be explicitly included.

Similarly the 1995 *National Arts Related Design Competency Standards* were developed by the National Industry Training Advisory Board Arts Training Australia (subsequently renamed CREATE Australia and ultimately subsumed into the Innovation and Business Industry Skills Council in 2004). This initial standards document acknowledged the critical importance of creativity as a 'vital' feature of design. At that time the mandatory standards governing all curriculum development in VET asserted that, 'Designers are expected to solve problems creatively, to be imaginative, to think laterally, and to extend and transform problems by designing innovative solutions. Encouraging and promoting creativity both for oneself and one's colleagues and contacts is seen as an essential underpinning aspect of competency' (Arts Training Australia, 1995, p. 3). Unfortunately, like the Mayer report, the *National Arts Related Design Competency Standards* (Arts Training Australia, 1995) also proved ineffectual in not taking the assertion that creativity is 'an essential underpinning aspect of competency' any further. Despite the national endorsement of these mandatory competency standards for design they fundamentally failed to address 'how' creativity might be engendered in vocational design education and training in Australia.

Precisely, the same shortcoming was repeated in a subsequent report on the 'Key Competencies and Design Project' by Jackson and Doyle (1996) *Education by Design*. This project extended beyond VET to school education. Previous design research was reviewed and correlated across a very wide range of educational input to inform the K-12 school curriculum review in NSW. This report underpinned major updating of the secondary Design and Technology syllabuses by the NSW Office of the Board of Studies. However, despite the specific focus on design, much of the literature skirted the issue, clinging instead to an implicit understanding of creativity in design practice and 'creative problem solving' in order to argue a case for design content and process. With a focus on design knowledge and skills, the more complex attitudinal component of creativity was

conveniently left aside because once again it proved too difficult to define. Jackson and Doyle (1996, p. 6) noted however that, 'In view of the relative newness of design teaching in schools … further education research on how students learn to design and how students learn by engaging in the creative design process is required'.

This demonstrates the extent to which creativity has tenaciously resisted classification as an underpinning competency. Industry, higher education, vocational education and training, as well as schools based educational research seem to have had very significant difficulty in dealing explicitly with creativity. This may be because creativity throws up multiple contingencies that confound attempts at overly simplistic or reductive explanations. So creativity proves instrumentally unamenable to atomistic standardisation. As an observable phenomenon, human creativity is inherently adaptable and complex. It is therefore reasonable to conclude that creativity might be more readily understood to operate as an iterative, open-ended higher order capability. Viewed holistically as an overarching principle, creativity then becomes particularly relevant as a versatile means of managing and responding constructively to unique situations that are overtly flexible, multifactorial applications in design practice and design education.

The Australian National Training Authority funded further research into a range of 'employability skills', including those associated with innovation and change. In *At a glance: Defining Generic Skills* (NCVER, 2003, pp. 7 & 11) implementation of the Mayer Key Competencies across Australian curricula was assessed and compared with definitions of generic vocational skills from the United Kingdom, United States of America and Canada. Interestingly, the American research lists creativity as a higher order thinking skill, not an underpinning competency. In the Australian VET sector, NCVER research identified that, '… there are some skill areas which are not being well addressed… (including) creative problem solving'.

Recognising the crucial role education and training have in responding to change, it seems that the Australian government is aware that something needs to be done to stimulate creativity. Yet the critical pedagogical question remains unanswered as to 'how' creativity can be reliably stimulated and nurtured across various educational sectors and disciplinary contexts. Recommendations from the Innovation Summit (Miles, 2000)

include the introduction of an enterprise focus in schools for example. Recurrent calls for improved teacher education are always thought important in bringing about cultural shifts by '… preparing teachers who are not only enterprising in themselves but who will be able to inspire a spirit of enterprise and creativity in their students … (through) multi-dimensional … personal attributes … and … the so-called 'soft skills' of problem-solving, effective communication, teamwork, self-management and a global mindset…'. In particular, the *Innovation Unlocking the Future* (Miles, 2000) recommendations numbers fifteen and thirty five respectively advocate among other priorities that the Federal government adopt a centralist policy by establishing, '… a curricula which balances knowledge content, innovation, entrepreneurship and creativity in the whole education system'. The 2004 re-election of the Liberal government of Prime Minister John Howard, with an increased majority and control of both houses of the Australian parliament, now makes this prospect a very real probability. However, there is a paucity of evidence to suggest that the government understands 'how' to balance pedagogically knowledge content, innovation, entrepreneurship and creativity across school, vocational and higher education curricula.

As already demonstrated in relation to the massive investment in competency standards development, similar centralist initiatives implemented in vocational education and training in Australia since 1992 have done little to improve forward thinking or creative responsiveness in education to the ever-shifting demands of the world of work. Even if it were legislatively possible, under shared State and Federal Government responsibility for education services, to devise and extrapolate a national approach to standardising school, or indeed higher education curricula in teacher education for example, such a move seems doomed to fall short of uniformly engendering increased creativity at a system wide level. This is so because the critical question as to 'how' pedagogical appreciation of the nature of creativity can be reliably translated into actionable teaching and learning strategies is still to be satisfactorily addressed. In *Emerging Futures: Innovation in Teaching and Learning in VET* Mitchell (2003, p. 2-3) recognises that, '… innovation in teaching and learning can be impeded by countless factors … (including) an inability to convert creative ideas into innovative services that can be implemented'. The need to explicate a pedagogy of creativity is nowhere more important than in design education across all

specialist applications and all educational sectors because design without creativity is moribund.

Considering the specific issue of teacher education, faculties of design and education are traditionally separated at the university level. Aspiring designers and design teachers are generally trained independent of one another according to quite different educational philosophies. There is surprisingly little professional cross-referencing on relative content knowledge or skills, let alone pedagogy. Ramsey (2000) notes this debilitating predicament in his report to the NSW State Government *Quality Matters - Revitalising Teaching: Critical times, critical choices*, observing that student learning is directly contingent upon the manner in which students are taught:

> Pedagogy cannot be separated from the curriculum: the dancer cannot be separated from the dance… Inordinate interest exists in universities in the school curriculum (but)… When the question is asked about the pedagogy needed to teach a prepared syllabus, the discipline areas have little to offer …For a university to be at the forefront of research in its discipline without being expert on the pedagogy required to pass on its major concepts to others, is an anomaly … Only teachers and teacher educators, acting as members of a strong and creative profession, can resolve the issues now confronting them… Teaching must be a profession with an unambiguous commitment to quality in practice and service. Only then will teaching have any possibility of being a vital and creative calling in contemporary society. (Ramsey 2000, p. 13)

More than any other factor, this highlights the requirement that teachers seeking to engender creativity in their students must themselves first understand what it means to be personally creative, not just as creative design practitioners but also as creative teachers of design. Prentice (1995, pp. 10-14) highlights the foundational importance of, '… active learning, through which investigative, practical and attitudinal skills and capacities … (are) enriched by … designers' insights into their own creative processes.' Focussing on the reflective aspect of teaching Prentice queries what comes first, design or education, practice or pedagogy, arguing the need for 'coherence' and 'tolerance' in understanding dual motivation. Design teaching is thought to require an appreciation within teacher education of the inherent 'uncertainties' and 'risks' associated with the '… painful but inevitable condition of creative behaviour… (where) consequences of actions judged to be unsuccessful can also be used to advantage' especially in re-engaging and renegotiating practical design outcomes. Most perceptively Prentice notes:

> For an artist or designer, the decision to train as a teacher raises fundamental and complex questions about professional integrity, creative energy, belief system and self-image. Attitudes that influence

responses to such questions include those which support a strong commitment to personal creative work. It is significant that the vast majority of intending teachers of art and design are motivated by a very strong subject allegiance and by an equally strong sense of personal identity. First and foremost they see themselves as beginning teachers of art and design, with roots firmly embedded in their identity as person-as-artist, -craftsperson or -designer. Their interest in, and understanding of, a teacher's wider professional role evolves gradually during the period of initial education and training and the induction year. This growth process, through which a wider perspective on teaching is cultivated, cannot be enforced. It is important that this development pattern is acknowledged by those involved in teacher education … It is vital that they display an empathetic understanding of creative artists, craftspersons and designers in order to help student teachers make personal connections between art and design and pedagogy. (Prentice 1995, p. 11)

Such understanding is commensurate with British government research in *All Our Futures: Creativity, Culture and Education* (Robinson 1999) with respect to the relevance of 'teaching for creativity' in design education. A National Advisory Committee member in England suggested that a teacher's job '… is not just about numeracy and literacy… it's about vigilance, kindness, empathy and creativity'. Therefore it seems clear that creativity cannot be regarded as an incidental or accidental by-product of standardised education simply because creativity is not just a procedural 'add-on' to technical competency in design or any other discipline. Instead holistic creativity requires and responds to appropriately targeted teaching practices at all levels. This British research suggests:

Teaching for creativity involves teaching creatively. Young people's creative abilities are most likely … developed in an atmosphere in which the teacher's creative abilities are properly engaged … teachers cannot develop the creative abilities of their pupils if their own creative abilities are suppressed. This too has implications for the curriculum – and in particular for the type and amount of national prescription of what is taught and how, and for teacher training. Teaching for creativity is a demanding process which cannot be made routine. However, it is possible to identify some general principles… in teaching for creativity (including): 'encouraging', 'identifying' and 'fostering' (strategies)… (Robinson 1999, para. 165)

The Australian Government 'agenda for action' *Australia's Teachers: Australia's Future'* (Committee for the Review of Teaching and Teacher Education, 2003) seeks to advance innovation, science, technology and mathematics by purposefully cultivating creative capabilities to underpin scientific innovation. Schools and teachers are expected to develop '… creative individuals able to communicate well, think originally and critically, adapt to change, work co-operatively, remain motivated when faced with difficult circumstances… connect with both people and ideas… capable of finding solutions to problems as they occur'. In particular, the Committee for the Review of Teaching and Teacher Education (2003) advocates fostering a 'climate of innovation' in schools where:

… teachers adopt creative approaches, take calculated risks within agreed frameworks, reflect constantly on their teaching and on student outcomes, reach out to share community resources, work together to achieve best outcomes for students, and embrace technology that enhances their work and students' learning… For students' innovative capacities to be realised, schools and teachers need to cultivate in students – and themselves model – creativity, imagination, original thinking, open mindedness and critical thinking. Schools and teachers help predispose students to be innovative by motivating them to seek better ways of doing things and helping delineate for them possible forms of exploration and experimentation… (Committee for the Review of Teaching and Teacher Education 2003, pp. 5 & 7)

Unfortunately in increasingly prescriptive learning climates, devoid of values rich experiential appreciation of the emotional and physical commitment required for teachers and students to 'be creative', government proclamations about innovation are mere rhetoric. In England, Australia and elsewhere educators in design and technology rail against contradictory expectations, engaging in earnest debate about 'how' creativity can and should be dealt with in education. For example, Australia hosted the third biennial international conference of Technology Education Research in December 2004. This event brought together over eighty delegates from universities around the world with shared pedagogical commitment to design, technology and teacher education.

Reflecting at this conference on the apparent disjuncture between concepts of creativity and innovation, within restrictive educational contexts in Australia and overseas, Keirl (2004) argues that creativity enables innovation and is therefore a primary concern for teachers of design and technology. He links creativity with imagination and innovation with invention. Keirl identifies courage and risk taking as key determinants for building creative capability, along with imagination, rule breaking and 'shift thinking' that, '… will be of serious interest to sensitive educators but will remain of little interest to educational instrumentalities'. He points to the dehumanising impact on teachers of 'growing instrumental agendas' where creativity and innovation are used as economic 'tools' that places both the student and the teacher in the position of a 'tool personified'. Erosion of the pedagogical decision-making powers of teachers is said to relegate them to the role of technicians who are obliged by the conditions of their employment to uncritically enact government policies and priorities. Conformity to rigidly predetermined curriculum constructs, or 'curriculum cramping', omits the means and the opportunities for teachers and students to meaningfully construct learning experiences requiring

engagement in creative activities that intentionally deviate from the status quo. Keirl (2004) argues:

> If a democratic society calls for a democratic curriculum and a thinking society calls for a thinking curriculum, then surely a creative society calls for a creative curriculum… So far as the individual is concerned creativity can be considered an aspect of consciousness, of expressing one's being… Thus we could frame education around a student's right to fulfil their creative potential. But this must still be critical education that is values rich… Clearly this presumes a certain kind of teacher and teacher education. Design and technology (education) demands particularly sophisticated teachers who develop particularly sophisticated pedagogies…. to successfully facilitate the spectrum of learning styles needed in design and technology as well as to foster creativity, designerly behaviours, critical thinking and value judgements. (Keirl 2004, p. 87)

While it may not be possible to divert Australian government plans to bring control of all education under one policy and curriculum framework, it nevertheless remains worthwhile to investigate the question of how creativity is made teachable in design education.

What educational theories underpin design education?

Ample evidence exists to suggest that the intersection of design and creativity with education represents a critical nexus of pedagogical concerns. Design education is situated at the heart of contemporary efforts to reconcile the demands and opportunities of the 'knowledge economy' as it relentlessly picks up momentum in the twenty-first century. Traditional approaches to design practice, to education practice and to design education practice need revision if current and future generations are to keep pace with change. One aspect of negotiating this change process undoubtedly involves pedagogically coming to terms with the enacted nature of human creativity. For art and design teaching, Prentice (1995) suggests that this is possible through reflective practice:

> Effective reflective behaviour requires teachers to subject their own practice to scrutiny within a conceptual framework: a framework which does not limit itself to one particular theoretical interpretation or one practical approach… It is the richness of reciprocal relationships between theory and practice that provides the basis for reflective teaching: the means through which experience is contextualised, understandings are extended and insights deepened… Central to successful reflective practice is the ability to make explicit those aspects of professional practice that too often remain implicit …reflective teachers need time to grow and develop; to become confident in their belief in self and in their capacity to make informed professional judgements about teaching and learning; and to generate their own ideas and identify creative directions within a shifting educational, social, political and economic landscape. (Prentice 1995, p. 15)

Despite various aforementioned government reports and funding initiatives creativity remains to a very large extent implicitly buried within educational notions of design,

innovation and entrepreneurship. From a research perspective, the task at hand is to make creativity pedagogically more explicit in order to render it accessible and susceptible to overtly targeted teaching and learning practices in the classroom, studio and workplace throughout the life of individual learners, teachers and practitioners. Considering concepts of creativity in terms of educational theory and practice draws attention to certain theoretical priorities currently informing design education.

Building upon the ideas of earlier commentators on the topics of ideation, inventiveness and learning, dating as far back as the ancient Greeks for example, concepts associated with creativity have been a matter of some recurrent interest to philosophers and theorists in many fields throughout the twentieth century. Not the least of these is John Dewey (1859-1952), who questions Aristotle's separation of *praxis* ('worldly action') and *phronesis* ('practical wisdom'), from *techne* ('skill' or 'know-how') and *poesis* ('making'). In response to Aristotle, and leveraging the nineteenth century work of Pierce and others, Dewey asserts a continuum of holistic practical reasoning, where all reasoning is deemed practical. Garrison (1999) explains how Dewey links knowledge, skill, action, feeling, attitudes and values together in relation to the philosophical notions of 'ends', 'means' and 'ends in view'. Considering creativity in these holistic terms, Dewey's observations are significant:

> … ends are ends in view or aims. They arise out of natural effects or consequences… (that) constitute the meaning and value of an activity as it comes under deliberation. Meantime of course imagination is busy. Old consequences are enhanced, recombined, modified in imagination. Invention (creativity) operates. Ends are foreseen consequences which arise in the course of activity and which are employed to give activity added meaning and to direct its future course. They are in no sense ends of action. In being ends of deliberation they are redirecting pivots in action. (Garrison 1999, p. 295)

Holistic understanding, as advocated by Dewey and others, provides certain clues as to how creativity might be approached more explicitly in design education. By attending to the emotional, attitudinal and value based considerations discussed in more detail in subsequent chapters, active or embodied learning processes typical of situated studio and project based design teaching become important. Particularly so in relation to educational theories of experiential or problem based learning, professional judgement and productive learning. For example Prentice (1995, pp. 13-14) cites Elliott (1991) in arguing for a 'creative model of professionalism' in art and design teaching that acknowledges the need

for qualitative rather than performance indicators. Teaching qualities of 'open-mindedness' and 'tactfulness' are seen as essential for developing holistic understanding of situations, underpinned by 'reflective and non-defensive responses to criticism'. The creative ability of teachers to self-monitor and take initiative is said to be important especially when, '… proposing, implementing and evaluating problem based solutions (that) manifests a capacity to take risks in the face of uncertainty, to believe in and trust oneself as an agent of change'. Significantly, this pedagogical approach focuses on:

> Attitudinal dimensions that can be traced back to the three conditions which Dewey (1933) refers to as 'open-mindedness', 'responsibility' and 'wholeheartedness'. Open-mindedness makes possible the coexistence of alternatives as a result of which reflective processes and procedures gain in rigour. The means through which teachers can influence ends as well as means relies upon 'intellectual responsibility', through which integrity is secured. Wholeheartedness … encapsulates the level of energy and enthusiasm generated by those teachers who are immersed in subject content and committed to its propagation and dissemination. (Prentice 1995, p. 14 citing Elliott, 1991)

Therefore, those with a commitment to design and design education must value and facilitate student freedom to experiment and take calculated risks as an essential component of learning. The same principle applies equally to the creative teaching of design. Arbitrary definitional separations of the objective from the subjective, or questions of verifiable fact versus subjective and inquisitive exploration are of little or no concern to the majority of designer practitioners. Instead most designers, and by extension most designers who teach, tend to opt for intuitively integrated, often interdisciplinary and open-ended approaches. The goal is not to verify existing information, but to test and push beyond knowledge boundaries, avoiding wherever possible any dependence on closed propositions, formulaic rules or 'canons' that might render their design work or the design work of their students derivative, predictable, redundant or worse still mundane.

Schon (1983) delineates a compatible educational framework within which to discuss activities such as design, involving a dynamic three phase, action-based model of reflective practice. This encourages a form of meta-practice in his analysis of 'reflection-in-action', 'reflection-on-action' and 'reflection-on-reflection-on-action'. Researching the 'tensions in a theory of designing' Schon (1988) establishes that designers share 'patterns of reasoning' akin to the sort of reasoning used by most people in going about their daily lives. He notes that, 'Rules were largely implicit, overlapping, diverse, variously applied,

contextually dependent, subject to exceptions and to critical modification'. Schon discounts 'technical rationality' as an explanation of design, instead describing his research as a 'quest for a new and more satisfactory epistemology of practice … explor(ing) what professional practitioners know and how they reason, especially in situations of uncertainty, uniqueness, and conflict'.

Noting 'four fundamental tensions' Schon considers the creative patterns of reasoning in design activity in terms of 'conditions of complexity … that take cognizance of multiple ways of seeing things'. This includes notions of, 'tacit and explicit knowledge', 'uniqueness and generality', 'generativity and cumulativeness', and 'pluralism and commonality'. With respect to the nature of design knowledge(s) Schon poses the following questions, '… if we reserve 'knowledge' for what can be made explicit, (how) are we to explain what designers know? And if, on the contrary, we recognise designers' tacit knowledge, what shall we say about the ways in which they hold it, or get access to it when they need it?'

In some respects this is the crux of 'how' creativity is made teachable in relation to design education. By unpacking creativity as a multifaceted higher order capability, the value-based, attitudinal and motivational frameworks underpinning creativity in action start coming to the fore. Acknowledging the judgmental, social and perceptual aspects of design, Schon eschews a problem solving analogy in favour of correlating design with 'making', which he discusses in relation to, '…designers' transactions with materials, artefacts made, conditions under which they are made and manner of making… (noting) several levels of 'making'…'. Schon (1988, p. 182) agrees with Dewey (1938) in characterising design situations as 'problematic' because, '… designers discover or construct many different variables… (that) interact in multiple ways, never wholly predictable ahead of time…'.

The problematic nature of 'design as making' offers some interesting insights into the fully embodied practices of designing in a creative context that go beyond the primarily intellectual constraints of 'creative thinking'. Notions of 'making' indicate the attitudinal interrelatedness of design thinking with design doing. In a text used to teach first year architecture students at the University of NSW in Sydney Lawson (1997) attempts to

demystify how designers think in terms of an individualised range of motivations underpinning designers working across a number of fields. He observes how:

> … designers have their own motivations, reasons for wanting to design, sets of beliefs, values and attitudes… For some designers this collection of attitudes, beliefs and values are confused and ill formed, for others they are more clearly structured and for some they may even constitute something approaching a theory of design… We might call these ideas 'design philosophies'… Whether they represent a collection of disjointed ideas, a coherent philosophy or even a complete theory of design, these ideas can be seen as a set of 'guiding principles' … likely to grow and change as a designer develops… over a number of years of practising design. There is clearly a two-way process. On the one hand the guiding principles influence and set the mental context for each design process. On the other, each design problem enables the designer to learn more about the guiding principles and express them ever more clearly… In this sense, design is also a form of research, it offers an action-based method of advancing knowledge. (Lawson 1997, pp. 162-163 & 183)

By drawing research parallels between the 'action-based', the conscious, the intuitive and even the unconscious 'organising principles' of design it seems reasonable to argue that overt teaching practices can be marshalled and refined to inform a pedagogy for creativity in design education. This includes concentrating not so much on the delivery of abstract content knowledge or overseeing the acquisition of technical skills. Rather teaching for creativity in design should focus pedagogical attention onto cultivating student confidence and building a meaningful appreciation of the deep, holistic attitudes needed to engage physically and psychologically in the 'doing' of design that is intentionally creative for both the teacher and learner. This proposition relies on the teacher nurturing and overtly valuing individual difference and encouraging disciplined risk taking behaviour in learners rather than rewarding obedient conformity. Most importantly it requires teachers to value and actively model an embodied engagement with the learning processes of both thinking and doing through their own design teaching practices. In short, teaching for creativity requires understanding of teaching and learning as 'lived experiences' that teachers must share with students in a conscientious effort to integrate meaning and experience with theory and practice at every level. With respect to the importance of sharing attitudes, values and beliefs in design Lawson (1997) observes:

> Perhaps at this point it is worth remembering a definition of design (as)… 'The performing of a very complicated act of faith' (Jones 1966)… this helps us to understand the almost religious fervour with which designers will sometimes defend the 'principles' which underpin their work. It is indeed difficult to sustain the effort to bring complex design to fruition without having some inner belief and certainty. (Lawson 1997, p. 165 citing Jones 1966)

Yet such qualitative and affective awareness tend to remain tacit within the practice of design education, underpinning intuitive exchanges between teachers and learners. To justify this intuitive element in design teaching, formal design and teacher education often look to established learning theories as a means of validating traditional teaching practices. As noted earlier, prominent amongst these are Schon's theory of 'Reflective Practice', discussed in more detail subsequently, along with the highly influential theories of 'Experiential Learning' espoused by Kolb (1984) and 'Problem-Based Learning' articulated by Boud (1991), among other commentators.

Kolb's theory of Experiential Learning evolved over a period of seventeen years of educational research. It draws on the fields of psychology, philosophy and physiology to position the notion of experiential learning within the established humanistic and pragmatic traditions of Dewey, Lewin, Piaget and Vygotsky. Kolb's enunciation of experiential learning is both theoretically expansive and academically coherent. Coincidentally, publication of *Experiential Learning: Experience as the Source of Learning and Development* (Kolb, 1984) coincided with the peak of international growth in Western design education in the last quarter of the twentieth century. As such it had immediate appeal for a rapidly expanding community of American, British and Australian design academics in search of a robust pedagogical basis upon which to argue the merits of practice based design education.

The theory of experiential learning is therefore often used to substantiate and elevate the status of design as a professional discipline within academe. By supposedly bridging theory and practice, experiential learning theory is invoked to explain and justify the situated and practical nature of studio based design learning especially within a university context. In Australia the 1980s release of Kolb's work coincided with government restructuring of the tertiary education system that saw the shift of design education out of the art schools, then located within the Colleges of Advanced Education, and into the universities as mentioned previously. This placed design educators under duress. Many found themselves in the unenviable position of having to defend the resource requirements of studio based design education practices whilst also demonstrating an academically credible depth of underpinning research and theory to validate design as a

professional field worthy of inclusion in the higher education sector. The 'structural' models of experiential learning Kolb presents rely on a neat '… typology of individual learning styles and corresponding structures of knowledge in the different academic disciplines, professions and careers'. Design is located within the humanities, thus justifying the inclusion of practical studio based design courses and materials workshops within an existing academic hierarchy of university faculties akin to Architecture and Engineering.

However, in attempting to be educationally and professionally comprehensive, Kolb's theory of experiential learning has proved overly ambitious. When applied, this theory offers remarkably little insight into the specificity of professional practice in design or indeed in any other professional field. In so far as Kolb's theory identifies learning as the primary process of human adaptation, acknowledging creativity and design as important influential factors, many of the principles of learning from experience are broadly compatible with this discussion of creativity in design education. (Kolb, 1984, p. 32). But on closer examination, Kolb's interpretation of experiential learning is a product of its time, now appearing presumptive and somewhat dated. As an educational theory of twenty years standing, experiential learning exhibits the uncritical modernist tendency to privilege scientific inquiry as superior to all other learning methodologies. While Kolb does admit the relevance of the affective domain, his research methods and findings are steadfastly locked into a convergent scientific methodology that is preoccupied with cognitive considerations in terms of consciousness.

Kolb represents his theory as a complete and holistic analysis of the adaptive learning process. This is illustrated as one of a number of closed circular models, which tidily integrate five concentric multi-conditional modes of human functioning. Firstly, with scientific inquiry/research fixed at the centre of the model, Kolb describes the core of learning in terms of 'concrete experience', 'reflective observation', 'abstract conceptualisation' followed by 'active experimentation'. Secondly, this inner scientifically predicated circle is surrounded by the principles of problem-solving (after Pounds, 1965). This level includes 'select a problem', 'consider alternative solutions', 'evaluate consequences of solutions', 'select a solution', 'execute the solution', 'choose a

model or goal', 'compare it with reality' and 'identify differences (problems)'. Thirdly, problem solving is constrained within the boundaries of 'intelligence', 'design' and 'choice' reflecting a concern with finite decision making mechanisms (after Simon, 1947). Fourthly, creativity is divided into the four phases of 'incubation', 'insight', 'verification' and 'incorporation' (after Wallas, 1926a) that encircle decision making. Fifth and last, adaptive learning is characterised by a double outer casing predicated on 'problem finding', 'question asking', 'answer seeking' and 'portrayal of knowledge' that is reinforced by notions of 'exploring', 'focusing', 'grounding' 'structuring', 'investigation', 'verification' and 'communication'.

While the detail is undeniably elegant and the scope of the theory impressive, Kolb's model of experiential learning (Kolb, 1984, fig. 2.4, p. 33) proves overly simplistic and self-contradictory when applied to the highly iterative and variable nature of creative 'hot action'. In an effort to scientifically define the 'adaptive' nature of learning, the modelling presupposes precise and sequential stages and conceptual conventions that assume procedural certainty and consistency. The very logic and orderliness of the theory leaves little room for intentionally cultivating uncertainty or exploring ambiguity in the teaching and learning process. It neglects to consider the implications of new or unanticipated knowledge constructs and multiple (potentially contradictory) lines of inquiry or outcomes that may not be cognitively oriented. There is little merit afforded intuitive, or indeed counter-intuitive, approaches to knowing and learning. Neither is there much room for the embodied understanding that accompanies development of physical familiarity and experiential expertise with actions, tools, materials, processes or human relationships as the starting point for inquiry or the identification of a 'solution' without necessarily looking for a 'problem'.

Kolb's experiential learning model purports to hold 'true' across a very wide range of occupational contexts with the only variation deriving from how each learner (or profession) prefers to engage with the defined processes via different learning styles. Similarly Kolb's model for ' The Structure of Careers in Relation to the Structure of Learning, Knowledge and Fields of Inquiry' (Kolb, 1984, fig. 5.5, p. 130) is far too rigidly preconceived. In this case the concentric star shaped model uses radiating triangles

to delineate (and isolate) therapists, promoters, presidents, specialists, inventors, scientists, scholars and artists from one another according to core learning distinctions made between the 'divergent', 'accommodative', 'convergent' and 'assimilative' learning styles.

Where in Kolb's neat career configuration is there room for overlapping communities of practice and multiple career changes throughout life? Where is there a place for the mathematician who is also an accomplished and expressive musician, or the scholar who may be an elite athlete, or the painter who is an astute businessman or woman, or the engineer who is an innovative and socially aware designer like Gustave Eiffel? How does so rigidly conceived a theory of experiential learning account for the creative artist who is a meticulous observer of nature, an inventor of futuristic war machines or fanciful systems for apparently impossible aspirations like human flight as was the case with Leonardo Da Vinci? The complexity of Kolb's variously concentric models is certainly seductive but altogether too convenient and superficial when it comes to educating professionals in creative design practice. While the constituent pedagogical considerations may all be valid, and have proven to be extremely useful under some educational circumstances, the fixity of the modelling fails to reflect the persistently fluid and contingent nature of human experience, of human learning and especially of human creativity.

Irrespective of the theoretical shortcomings of Kolb's modelling of experiential learning, the need to improve understanding of how people can and do learn from experience remains critically important for this discussion of creativity. Boud (1989) outlines the potential relevance, the academic devaluing and the resulting pedagogical confusion associated with the theory of experiential learning, arguing:

> … the most pervasive form of learning in society …(is) that which comes by and from experience… In the formal education system it has tended to be devalued and regarded as somehow fundamentally inferior to those organised forms of knowledge which have been constructed as subjects and disciplines. The practical and the applied do not tend to have the same status in educational institutions as the academic and the abstract. Academic rigour is a commonplace of classroom discourse, that education should be true to the lived experience of learners is an alien idea…Indeed, the whole area of experiential learning is sorely in need of clear thinking and useful theory. It is not a straightforward matter to articulate what is good practice and how it can be achieved. (Boud 1989, pp. xi-xiii)

Subsequently Boud, Cohen and Walker (1993, pp. 8-16) put forward five considerations that assist in establishing better understanding of 'how' creativity can be made overtly teachable in design education. First Boud et al. assert that 'experience is the foundation of, and the stimulus for, learning'. Therefore to learn to be creative students and teachers need to experience what it means to 'be creative' in a design context. As previously noted, one strategy for doing this involves actively employing *'What if?'* and *'Why not?'* scenarios as an heuristic device for initiating and enacting design tasks in an open-ended and conscientiously creative way. As a pedagogical strategy, this requires that students and teachers set aside preconceptions of 'what is' in order to engage holistically with 'what might be' done.

Second Boud et al. assert that 'learners actively construct their experience'. This means that the design teacher need not necessarily be in full control of the creative learning experience. Rather the teacher functions as an experienced guide, or coach as Schon (1985, pp. 25 & 63; and 1987, p. 117, 157-163) observes, providing a conducive but flexible frame of reference and identifying the 'space' or 'intermediate zones of practice' within which creativity can be accessed and experienced by the learner. In this way learners can be encouraged, facilitated and perhaps even gently coerced to enter uncertain creative territory, but they cannot be forced. The creative experience associated with any particular learning activity will inevitably be lived and remembered differently by the teacher and by each learner in the class. The best way to invite, capture and value these different and often challenging or confronting experiences of creativity throughout the interactive design process is for students and teacher to openly acknowledge, reflect upon and share responses in the classroom. This is the collaborative function of the brainstorming, workshopping and critiquing processes traditionally used in studio based design education.

Thirdly Boud and his colleagues declare that 'learning is an holistic process … normally experienced as a seamless whole'. This insight merely confirms that creativity in design, as lived experience, cannot be effectively dealt with piecemeal using a linear procedural approach to content delivery or the achievement of atomistic 'competencies'. Rather it is best to try to establish an holistic creative context, an overarching mindset and a flexible

and inclusive environment where all issues and strategies remain subject to open-ended investigation and analysis in an iterative manner. This process of 'continual adjustment', or what Schon (1985, p. 52) calls 'double vision', implies that the creative engagement of both teacher and learner needs to remain contingent and adaptive, with scope to 'see and do things differently'. In this way the creative learning may be adjusted and carried forward from one design task to the next, thus allowing individual confidence, expertise and 'artistry' to build progressively amongst a cohort of students.

Boud's fourth learning from experience consideration reconfirms that 'learning is socially and culturally constructed'. Unavoidably, learners and teachers are both producers and products of the creative situations within which they design. This is as true of the learning situation in the classroom as it is true of the different real or hypothetical disciplinary and community situations encountered outside the educational institution. This supports Wenger's (1998) social theory of learning in terms of an overlap between narrow site specific and broader discipline based 'communities of practice' said to influence identity, meaning, practice and professional formation. When educating for creativity in design, priority therefore needs to be placed on finding ways and means of authentically locating self within each and every project. Subjectivity enriches creativity, whereas any attempt at feigned 'scientific' objectivity is prone to impoverish the design outcome by stripping it of the necessary 'connectedness' to the felt particularities of both the designer and the design situation. Design is credible only when its social or cultural relevance is felt and believed to be meaningful by the people it affects.

The fifth concern articulated by Boud et al. emphasises that, 'learning is influenced by the socio-emotional context in which it occurs'. Here human emotion underpins human creativity as it impinges upon perceptions of the aesthetic and cultural impact and appropriateness of design outcomes. To teach design creatively educators cannot remain aloof. To address creativity teachers and learners have no choice but to admit the emotional importance of beliefs, values and attitudes as primary motivating forces. In many cases creatively predicated attitudes toward designing will need to come before the educational delivery of skills, knowledge or theory. No quality of engagement or embodiment in the doing of creative design practice is possible without visceral and

emotional commitment from both teachers and learners. This constitutes a form of 'mindfulness' involving the 'conscious and continuous challenge of the categories and values we use to structure our experience, understand observations, and generate reasons for our actions, and the reconstruction of new categories, values, and concepts to replace old ones' (Moldoveanu & Langer, 1999, p. 221). Creativity requires interactive 'mindful' learning (Langer, 2000) based on shared human aspirations and relationships where the goal is mutual participation in the 'making' of socially meaningful design.

Paralleling interest shown in experiential learning, design educators since the 1970s and 1980s also developed increasing pedagogical reliance on the theory of Problem Based Learning. First adopted in medical and scientific education, problem based learning is a curriculum approach that seeks to shift the focus in professional education away from traditional modes of knowledge transmission toward a sharper focus on the proactive and investigative solving of problems. The reason for the interest of design educators in this theory lies in a long-standing tendency, discussed in the next chapter, to conflate creativity with the notion of 'problem-solving' unquestioningly, as if there is no creativity outside the finding and solving of problematic situations. Boud and Feletti (1991) canvas different perspectives on the theory of problem based learning under the common definition that, 'The principal idea behind problem-based learning is … that the starting point for learning should be a problem, a query or a puzzle that the learner wishes to solve'.

Using this approach, design learning is intentionally problematised by the educator on the theoretical assumption that the outcome of professional learning for students can be satisfactorily characterised in terms of appropriate, successful or correct 'solutions'. Problem based learning is a pedagogical strategy that once again privileges scientific methodology. It aims to chunk knowledge and skill acquisition into readily digested, sequentially structured, largely self-contained blocks of learning. The problems given to students are context-dependent and are generally preconceived in order to manage educational achievement and streamline administration of assessment. According to Boud and Feletti (1991), problem based teaching and learning activities are '… centred around key problems in professional practice'.

A major pitfall in problem based learning theory becomes apparent where students passively receive set problems from teachers but are not necessarily invited, encouraged or enthused to take initiative in instigating educational inquiry. Teacher-centred problem based learning strategies often make limited provision for self-direct exploration, thereby thwarting opportunities for students to genuinely experience things differently or make (what might be for them) novel discoveries, or pursue non standard or unresolved investigations or indulge in self-motivated personal creativity. Runco and Sakamoto (1999, p. 66) explain how ' problem solving' expanded progressively to include notions of 'problem finding' and 'problem (re)definition' as a means of manipulating 'problem perceptions' in the mistaken belief that this theoretical modification would automatically lead to improved creativity.

Russell (1999, pp. 180-195) offers an intriguing way out of this theoretical dilemma by arguing the merits of 'perplexity'. Examining the 'problems with problems', Russell questions the need to always problematise learning. Drawing on the work of various other authors he concludes that problem based learning carries within it an unfortunate tendency for teachers to atomise and perhaps even trivialise mono-dimensional small problems for the sake of ensuring relatively non-problematic solutions are readily available for students to find. Russell observes that the '… idea of a problem always seems to connote trouble – worrying concerns that what is actually happening is somehow a wrong to be righted'.

Imaginative design responses to social or cultural stimulus do not necessarily always classify as problems. In creative disciplines such as fashion design for example the generation of a new season range of swimwear is not necessarily predicated upon solving intractable functional or aesthetic 'problems' with the designs generated last season. Similarly creating an innovative weave or colour pattern or surface texture in textile design generally has little to do with righting some technical wrong or rectifying some other problematic aspect of previous textile samples or processes. Graphic design development of a new typographic font evolves out of alphabetic precedents, but such precedents present stimulus rather than a worry or cause for serious concern to be redressed. Problems certainly can be solved creatively and design opportunities can be

intentionally problematised. But of themselves perceived 'problems' do not necessarily automatically engender creativity. This begs the question, what does trigger or promote creativity in a teaching and learning context? Russell (1999) asserts:

> … perplexity is one of the defining features of reflective thinking and engagement… Unless there is a personal demand for a solution… there is no self-direction or genuine interest and no reflection because there is no problem owned by the learner through the acknowledgement of perplexity… For Dewey, perplexity is a key feature of the state of mind that initiates the growth of the individual… students learn, in depth, a great deal about a great many things in which they have interest … placing themselves in the way of perplexity to acquire new understanding. Such knowledge, of how to place the self in the way of knowledge, is essential to the maturity of a professional. We are all ignorant of what we do not know, how then can we come to know unless we have strategies that put us where we will be perplexed? (Russell 1999, pp. 1-2)

In summary, this chapter examined what constitutes design education, why creativity is deemed important and the pros and cons of certain theories underpinning design education. It broadly traces the evolution of design education from the nineteenth to the twenty first century as a means of understanding some of the factors informing shared aspirations and priorities that characterise design education in Europe, America, Britain and Australia. This brief historical overview focuses on the place and relevance of creativity in shaping design education in Australia across the three sectors of schools, vocational education and training, and higher education. It also establishes some appreciation of various underlying tensions between theory and practice in the institutional delivery of studio-based design education in relation to creativity and the relevance of reflective practice, experiential and problem based learning theories.

The matter of 'competency' versus 'capability' arose regarding the critical role of creativity in design education, with creativity emerging as a higher order rather than underpinning condition of professional learning. This distinction is especially pertinent to appreciating the ongoing vocational stresses manifest within design education in all sectors. Significant pedagogical difficulties persist where creativity is subsumed within reductive competency standards and prescriptive training packages currently being promulgated in Australian vocational education and training. Default to an educational ideology based on instrumental technical competency, rather than qualitative creative capability building, underscores the difficulty of unpacking creativity as an holistic and strategically valuable pedagogical notion in general school education and in specialist design vocational and higher education. Consequently, teaching for creativity is poorly

understood. Therefore it is not surprising that creativity is afforded little more than rhetorical lip-service in government policies and funding initiatives otherwise intended to stimulate innovation and promote enterprise initiative via scientific research and design and technology education in schools, colleges and universities throughout Australia. Recent calls to centralise curricula and reform teacher education may be stated priorities, but this is most unlikely to produce the desired results in the absence of a better appreciation of the holistic affective pedagogical considerations needed to encourage and support genuinely creative teaching and learning.

To teach design in a creative context, it is agreed that teachers themselves must enact creative teaching practices. Unmet expectations of teachers and calls for an improved professional understanding of creativity in teacher education further substantiates the need for pedagogical strategies addressing 'how' creativity is made teachable in design education. Reference to the role of perplexity underscores the importance of attitudinal considerations and confirms the relevance of reflective teaching practices. These are themes taken up in subsequent chapters along with the need to engage emotionally and physically, as well as cognitively, with the fully embodied nature of creative teaching and learning in design as a practical discipline.

In the next chapter, extant definitions and theories of creativity are examined. This draws on a wide range of information from disparate fields of research. Common assumptions involving various popular strategies or techniques thought to promote creativity are discussed in relation to the evolution of academic research and theoretical ideas about creativity emerging from sociology, cognitive psychology and neurology in particular.

…………………….

Chapter 5:

<u>UNDERSTANDING CREATIVITY</u>

Different understandings of creativity are compared in this chapter. This involves asking difficult questions about what creativity is and how it should be examined. Canvassing many theoretical views, that contribute to partial, confused and at times contradictory conceptualisations of creativity, opens up the possibility of a more expansive and holistic re-conceptualisation of the topic. This re-conceptualisation of creativity offers clear implications for more insightful teaching and learning that are examined in some depth in the next chapter.

The vexed definitional question '*What is creativity?*' is examined first to identify those informal views and formal theoretical perspectives dominating creativity research over more than a century. Many tacit beliefs underpin the way creativity is conceptualised especially in terms of genetic predisposition, personality traits and mental processes. A brief theoretical overview helps locate the origin and explain the evolution of persistent fallacies and many self-limiting assumptions thwarting contemporary appreciation of human creativity in education. The second question '*How should creativity be examined?*' tracks the progress of scientifically oriented research into creativity. This reflects a longstanding preoccupation with separating out and empirically testing the cognitive foundations and psychological dimensions of creativity in relation to 'creative thinking'. Associated with this is an ongoing fascination with the human mind and attempts to unravel how the brain works as a neurological mechanism.

Taken together, these two initial lines of enquiry indicate the complex and recalcitrant nature of creativity as a higher order capability demonstrating the extent to which research into creativity remains a frustrating and tantalisingly incomplete project. The inadequacy of older conceptualisations of creativity exposes gaps in current understanding, which highlight the need for a radical re-conceptualisation of creativity as a fully embodied and culturally proactive human attribute. This has implications for how

creativity might be better understood and more closely targeted in future, in design and other educational contexts.

Past efforts to definitively analyse the intellectual or cognitive aspects of human creativity, in isolation from beliefs, attitudes and the physical engagement in acting creatively, have failed to crystallise into a coherent understanding of creativity. Until quite recently scientifically motivated objectification of creativity imposed an overly narrow research bias, which served to obscure and marginalise other critically important affective considerations such as the role of emotion in rational thought and intuitive interaction. Here, developments in neuroscience and especially the work of Antonio Damasio are informative in drawing attention to potentially deeper interpretations of what it actually means for individuals and groups of people to be actively and consciously creative.

By broadening the discussion of creativity, to take account of various other considerations, it becomes heuristically possible to reposition the notion of creativity as an evolutionary 'meme' or recurrent motivational force that functions over time as a powerful impetus for, and consequence of, all manner of social and technological change. This approach to the topic enables a reconciliation of what is known as ordinary everyday 'small c' creativity with more noteworthy socially significant 'big C' creativity. As such, creativity is shown to exist not simply as a discrete mode of individual human thinking or performance, but also as a pervasive cultural determinant. Such a reappraisal of creativity acknowledges the multidimensional and fundamentally integrated, contingent and adaptive nature of creative outcomes and behaviours. This confirms that creativity is not reducible to any preconceived rule-driven process, but rather operates freely in the world as a higher order human capability that is both complex and inherently variable.

Relevant literature echoes with competing voices extolling various observations about creativity, which are in turn complemented by authoritative summaries and academic interpretations. In response this investigation adopts an eclectic strategy to intentionally juxtapose selected theoretical insights from authors in many fields to substantiate the need for an alternate more holistic re-conceptualisation of creativity later in the chapter. In the process it is important to take note of the jumble of propositions and preconceptions. This

draws attention to significant gaps in current understanding and reveals the overlaps in past research in relation to a wide range of theories about intellect and human agency, especially when coupled with the often-neglected emotional, attitudinal and motivational attributes that constitute human creativity as lived experience. These concerns are taken up again in a philosophical context in the next chapter to explore the embodied experience of creativity, looking particularly at those aspects of means, motivation and action that underpin how creativity is made overtly teachable in design education.

What is creativity?

While the notion of 'creativity' is very familiar, it has nonetheless been shown to be extremely multidimensional. This is underscored by the realisation that, in spite of very considerable research effort over more than a century, an academically precise and widely accepted definition of what might be said to determine or describe creativity has proven difficult, if not impossible, to establish. During the twentieth century many attempts were made to define creativity, including almost as many meta-analyses of these definitions. Suggesting that creativity as a term is '… in need of precise distinctions among the referents it has acquired' Barron and Harrington (1981) surveyed the already extensive literature on creativity at that time observing:

> Commonly used definitions of creativity vary in several ways… some definitions require socially valuable *products* if the act or person is to be called creative, while others see creativity itself as being intrinsically valuable … Definitions may vary also in terms of the level of accomplishment recognised as creative: difficulty of the problem seen or solved… or elegance or beauty of the product or the nature of the impact. A third kind of distinction is between creativity as achievement, creativity as ability, and creativity as disposition or attitude. (Barron & Harrington 1981, p. 44)

Twenty years after the largely psychological review of 'Creativity, Intelligence, and Personality' (Barron & Harrington, 1981), Craft (2001) notes precisely the same predicament in an extensive and authoritative report analysing research and literature on 'Creativity in Education' for the Qualifications and Curriculum Authority in Britain:

> The concept of creativity has traditionally proved an elusive one to pin down … One major distinction made by analysts is that between 'high' creativity and ordinary, everyday, creativity. Another of the distinctions is between creativity within specific domains as opposed to creativity as a separate process, applied within domains. (Craft 2001, p. 13)

Numerous projects conducted throughout the twentieth century, by generations of researchers working individually and collaboratively in a variety of academic fields using

different methodologies, sought to articulate a concise, necessary and sufficient definition for creativity. While this work generated much contextual information that remains interesting and useful, it repeatedly failed to deliver a simple all encompassing definition for creativity that is widely accepted. For example, Wallas (1926, pp. 79-96) supplied one of the most widely influential characterisations of creativity framed in terms of 'problem solving'. This theory describes four stages of thought needed to bring a concept to fruition. Wallas's four-stage process includes a period of 'Preparation', when a problem is identified and broadly investigated. 'Incubation' follows, during which time the problem and all the information gathered about the problem is relegated to the back of the mind to rest and be available for informal consideration in a sub-conscious or unconscious manner. The third stage is 'Illumination', when a resolution to the problem presents itself to the conscious mind. A final stage of 'Verification' occurs when the cogency of the solution is assessed in relation to the parameters of the original problem and a range of applications. Interestingly, Runco (1997, p. 100) incorporates Wallas's four stages of creativity as the core of a more complex six-stage matrix with the addition of 'Communication' and 'Validation'. These six considerations are then cross-referenced against cognitive process, experiential contents and emotional feeling to encapsulate the various psychological elements thought to be involved in achieving a creative product.

Sampling other definitions of creativity, C. R. Rogers (1954) posits, in a paper titled 'Towards a Theory of Creativity' that, '… the creative process is … the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people, or circumstances of his (or her) life on the other'. Thirty years on Vernon (1984) suggests that creativity involves '… a person's capacity to produce new or original ideas, insights, restructurings, inventions or artistic objects, which are accepted by experts as being of scientific, aesthetic, social or technological value'. Adopting another stance Sternberg (1999) observes:

> An alternative to defining creativity in terms of novel and useful *products* is to consider it a property of thinking… Koestler (1964) defines creativity in terms of the capacity to make connections – to bring together previously unconnected "frames of reference"… I like this connotation, especially with the qualification that originality should be understood to mean original or novel to the individual involved, so that a thought would be considered creative if it is novel to the one who produces it, irrespective of how many others may have entertained that thought. (Sternberg 1999, pp. 393-394 citing Koestler 1964)

Without necessarily reaching a consensus, many researchers have cross referenced their findings. The resulting theoretical layering indicates that creativity probably has as much to do with domain-specific knowledge, social interaction, community and the environment, as it does with the personality or cognitive abilities or the particular thinking styles of individuals who may or may not be deemed creative under differing circumstances. For example, Gardner (1999) looks at creativity in relation to many contingent considerations through the cognitive perspective of his theory of 'multiple intelligences'. He concludes that creativity does not qualify as a separate intelligence. Rather in his view creativity is perhaps better understood as a qualitative attribute that can influence the application of other intelligences. This shifts the focus of attention away from the inherent or characteristic properties of individual creative performance onto what he sees as the more important issues of context and validation:

> … *creativity* has revealing parallels with, and differences from, my definition of *intelligence*. People are creative when they can solve problems, create products, or raise issues *in a domain* in a way that is initially novel but is eventually accepted in one or more cultural settings… Both (intelligence and creativity) involve solving problems and creating products. Creativity includes the additional category of asking new questions … Csikszentmihalyi proposed that we should not ask who or what is creative but, instead where creativity is… The concept of 'field' calls attention to the fact that 'creativity' essentially and inevitably represents a communal judgement. (Gardner 1999, pp. 204-205)

Concurrent with Gardner's investigations into multiple intelligences, Csikszentmihalyi (1996) concentrates on prominent and easily recognisable 'big C' creativity using a 'systems model' within a three-pronged interpretive frame of reference. He describes a critical nexus between creative activities in a disciplinary *domain*; the opinions of experts in the *field*, acting as arbiters or 'gatekeepers' over disciplinary recognition; and the output of a creative *person,* who successfully plies the 'symbols' of a given domain in expressing a new idea or novel pattern deemed a noteworthy contribution to that field. For example in the visual arts domain Csikszentmihalyi explains, '… the field consists of art teachers, curators of museums, collectors of art, critics, and administrators of foundations and government agencies that deal with culture. It is this field that selects what new works of art deserve to be recognised, preserved, and remembered'. Adopting the objective stance of a scientist, who is widely respected and experienced in researching creativity in terms of cognitive psychology, Csikszentmihalyi (1996, pp. 23-28) poses the question of 'where' creativity might be located. He confidently asserts that, '… creativity does not happen inside people's heads, but in the intersection between a person's thoughts

and a sociocultural context. It is a systemic rather than individual phenomenon… Creativity is any act, idea or product that changes an existing domain, or that transforms an existing domain into a new one'.

Offering a counter argument in response to the question of what creativity is, Nickerson (1999) cautions against such exclusive definitions that privilege 'big C' socially validated creativity over 'small c' everyday creativity:

> … however we conceive of creativity we should not make its existence dependent on its being recognised as such. By definition, we are not aware of creativity that goes unnoticed, but we have every reason to believe that it exists. Much of the work in science and art that has been recognised as extraordinarily creative has not received this recognition until long after it was done; many products that have eventually been judged by society to be valuable or useful were considered worthless or worse when first produced. We cannot rule out the possibility that for every creative product that is eventually recognised as such there are others that go unnoticed indefinitely. (Nickerson 1999, p. 393)

From the somewhat more subjective and pragmatic vantage point of a teacher of creative writing, who deals in the day-to-day engagement with creativity on his own behalf and that of his students, Brophy (1998, p. 11) also cautions against assuming too much certainty about creativity. He notes that, '… the activity we call creative… can be experienced and used very differently in different contexts, (in) that it carries with it certain contradictions… The notion of creativity throws up a number of oppositions which highlight the way its presence shifts under our gaze or slips through our fingers or the way it takes us by surprise despite and because of our (definitional) maps'.

Many researchers have sought to understand creativity by pondering the backgrounds and listing the personality and intellectual attributes of prominent people such as Leonardo Da Vinci, Charles Darwin and other famously creative historical figures. Some theorists speculate about the range of cognitive processes or procedural techniques that such individuals may have employed in generating, analysing and synthesising innovative ideas. Efforts to categorise different types of ideas, products or processes commonly associated with creativity aim to develop criteria for the attribution of relative theoretical merit or scale of technological importance or cultural value or economic impact of creative outcomes over the immediate or longer term.

Studies have been done on the fields of specialist activity and the professional domains where creativity has been shown to reliably occur. Researchers also look at the familial,

social, professional, educational or other environmental conditions under which creative output has arisen. Coupled with this is an ongoing concern with how reliable strategies might be identified for enhancing, encouraging and nurturing creativity in children and adults toward prescribed goals. Such goals are then justified as pertinent to good parenting and social well being, relevant education and training or personal and professional development outcomes, as well as enhanced cultural expression or indeed improved scientific, industrial or technological progress and prosperity for national economies and global initiatives.

Under such intense theoretical scrutiny and pressure of academic expectation, the term 'creativity' has demonstrated remarkable resilience, along with the propensity to flex and slide in use, metamorphosing in application to remain persistently fluid and open-ended. What is creative in one context is overlooked, taken for granted or overtly rejected in another. After more than a century of research and collation of that research into multiple meta-analyses, the matter of definition of creativity continues to fuel ongoing debate. Therefore it would appear futile to pursue further understanding of creativity under the rubric of one or other overarching statement. Similarly it would seem pointless to search for a better appreciation of the meaning of creativity for design within one or other avenues of research that have so far failed to delimit 'what' creativity is or is not deemed to be, or indeed 'where' it might be located.

How should creativity be examined?

This begs the question of how creativity should be examined. In relation to vocational education and training, Brown (2003) rhetorically asks, 'Can we afford to choose just one schema in preference over all others, do we really need to be corralled within just one conception, or is it appropriate to be strategically eclectic?'

Distinct advantages flow from adopting an eclectic approach to understanding creativity. A willingness to examine multiple meanings of creativity concurrently opens up the possibility that features drawn from different perceptions of creativity may begin to coalesce into new patterns that are more informative than either the separate statements or the sum of the parts. Indeed in the latter part of the twentieth century many researchers

working in the same or different fields with an interest in creativity suggest that this is perhaps the only promising way forward. Behavioural scientists, Sternberg and Lubart (1999) for example, discuss this proposition in relation to a 'confluence of approaches to the study of creativity'. Citing a multitude of academic references and various different multifactorial theories they argue:

> Many recent works on creativity hypothesize that multiple components must converge for creativity to occur… At the level of explicit theories Amabile (1983) describes creativity as the confluence of intrinsic motivation, domain-relevant knowledge and abilities, and creativity-relevant skills. The creativity-relevant skills include (a) a cognitive style that involves coping with complexities and breaking one's mental set during problem solving, (b) knowledge of heuristics for generating novel ideas, such as trying a counterintuitive approach, and (c) a work style characterized by concentrated effort, an ability to set aside problems, and high energy. (Sternberg & Lubart 1999, pp. 10-12)

Expounding their own 'investment theory' of creative ideation in terms of the confluence between synthetic, analytic and practical-contextual intellectual abilities, Sternberg and Lubart (1999) propose that creativity in fact requires some '… six distinct but interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation and environment'. They acknowledge 'numerous research investigations' pointing to the characteristic reliance of creative functioning on particular personality attributes, some of which include self-efficacy, perseverance in the face of obstacles, judicious risk taking, tolerance of ambiguity, willingness to explore unconventional approaches and the courage to assert and act upon one's convictions. However, even this is not the whole story.

Underpinning the multiplicity of factors influencing creativity Sternberg and Lubart focus on the potential importance of attitudinal considerations. Individual and collective 'attitudes' toward the merit of engaging creatively in idea generation may provide the determining motivational foundation that gives impetus to the so-called 'personality attributes' observable in creative people. Significantly Plucker and Renzulli (1999, p. 43) point to the 'measurement' work of Basadur and Finkbeiner (1985), Basadur and Hausdorf (1986) and others to suggest, '… theoretical and empirical support exists for a connection between ideational attitudes and ideational thinking… (but) Creative attitude research within education and psychology are limited, perhaps because of a perceived lack of application'.

In terms of knowledge, skills and attitudes it is noteworthy that the bulk of past scientific investigation into the nature of creativity has been generically oriented. It largely neglects the attitudinal dimension whilst disregarding the specificity of conviction, experience and application needed to achieve creative results in different disciplines. For example, the knowledge, skills, creative aspirations and training of a dancer or musician differs markedly from that of the furniture or interior designer or the architect. Nevertheless much research into creativity sets aside these differences in an attempt to break down cognitive processes and analyse certain 'creative thinking' habits or techniques in abstract. Other research examines the frequency and combinations of observable behaviours thought to be associated with creative performance. However, little explanation is available concerning how creatively oriented attitudes and beliefs arise and are culturally perpetuated as traditions. Avoidance of the affective dimensions may go some way toward explaining why it has proven so difficult to define creativity satisfactorily in simple terms. Difficulty most likely stems from a misplaced scientific desire to objectify and atomistically quantify creativity as a static phenomenon, rather than holistically acknowledging the qualitatively dynamic and subjective, interpersonal and intra-personal nature of enacted creativity.

This investigation into creativity as a higher order capability takes up the qualitative issue of attitudinal development, along with the equally important embodiment of personality as performance and the physicality of putting attitudes into action. These considerations are discussed in more detail later in this chapter and the next.

Conceptualising creativity more holistically

One possible way of more holistically conceptualising multiple aspects of creativity might be to consider it in terms of a continuum between alternative perspectives, with the mix of factors varying in combination and emphases at different points along that continuum. For example, rather than adopting a static either/or view of creativity, understanding could be argued to move along a pathway between 'small c' everyday personal creativity and 'big C' domain-changing historically recognised creativity.

Similarly it could be suggested that looking at the continuity between formal academic theories of creativity and informal or pragmatic perceptions of creativity might enrich understanding. This sets anecdotal evidence or 'common knowledge' derived first-hand from experience against empirical research findings. Interestingly, in terms of widespread acceptance by an international community of adherents it is the pragmatic, rather than the scientific, view of creativity that has gained the greatest currency in practice winning by far the largest and most conscientiously sustained following. This is evident in the global application of particular attitudinal or behavioural approaches to generating creative outcomes based on popular applied theories of creativity. Most notably, the creative strategies advocated by Edward de Bono are found by many people the world over to be an effective and reliable way to stimulate creative ideas in practice.

Another criteria could focus on the efficacy of particular techniques including comparisons between creative 'processes' and creative 'products', creative 'thinking' and creative 'action', leading into a discussion of different kinds of knowledge(s), skills and motivations associated with creativity. In short almost any broadly relevant theme might suggest a continuum somewhere along which a particular example of creativity can be positioned and plausibly explained. Useful as this continuity approach appears to be, a postmodern caveat throws into question over reliance on linear causal relationships. This inevitably limits the discussion of creativity, as it has limited creativity research in the past, to a preoccupation with various binary oppositions that include, exclude, privilege and marginalise various aspects of creativity. Instead a more holistic approach would be to create a conceptual space or territory within which differing approaches to creativity are understood to move freely and inform one another. This offers a more promising three-dimensional and dynamic understanding of creativity operating in an intellectual and corporeal climate of shifting priorities and changing circumstances that accounts for the differences as well as the similarities of creativity exercised in different disciplines.

Generally speaking, without recourse to prescriptive definitions, or empirical research findings, most lay and professional people alike would readily agree that creativity exists as a dimension of human experience and activity. Few would dispute the suggestion that creativity is about instigating or dealing with change, accepting that it derives from

noteworthy individual or collective human effort in generating and communicating something new, innovative or adaptive. But if asked to specify what in particular they believe constitutes creativity most people continue to equate creativity with the cognitive ability to think up novel ideas. In academic parlance this aspect of creativity is referred to as 'ideation', describing the generation of multiple ideas through cognitive processes applied to given situations or set problems. In an era advocating IQ testing, in the latter half of the twentieth century, this was the research premise for psychometic testing of creativity. Consequently, in the broader community and in the professional fields of design and education it is tacitly assumed that creative ideas by definition must come before creative action. However, this is not always the case. Despite the origins of such widely held assumptions, it is important to establish in this chapter that cognition and indeed metacognition are not independent of felt experience nor does creative thinking necessarily precede creative intuition or action.

A more holistic conceptualisation of creativity cannot begin without first broadening the conceptual frame of reference. Creativity may be affiliated with interesting ideas, but this does not explain where the ideas come from. For example, a creative idea might be triggered by a particular sensory experience of colour, form, texture, light, sound, space or movement not to mention temperature, taste or smell under certain circumstances. The stimulus for creativity might be a whim like wanting to fly like a bird or swim underwater or travel to the moon and back. An abstract notion might stem from a concrete encounter when water rises as one steps into the bath or the rapid blurring of objects outside an accelerating vehicle. The breeze through an open window, the fall of morning sunlight onto a building site or the rain sheeting off a water-resistant surface might suggest all manner of creative applications to those alert to the tangential possibilities. In fact creative responses might be suggested by almost any unanticipated or contrived situational opportunities that individuals or groups of people feel are significant and believe are meaningful in some potentially tangible way. Creativity is about perceiving, interpreting and linking physical, experiential and intellectual connections in new or unusual ways and then actively applying the resulting knowledge, skills and attitudes in real life situations.

A feeling or intuition may indicate that there is a better way of achieving some particular goal or improving some outcome. Creativity could result from planned or unexpected observation. The learned manipulation of materials, tools or processes might prompt speculation about what is possible or indeed impossible under a given set of circumstances that can then be tested, reframed and refined. Consider the scope of options when earthy minerals, clay or sand are subjected to heat, the fibres of a plant or the excretions of a grub are spun and woven into flax or silk. These are not the predetermined inventions of lone individuals but the cumulative creativity of generations. Change the circumstances and different possibilities or creative challenges will inevitably present themselves. Problems can arise that require human intercession in a non-traditional manner, and random experimentation or play can lay open new potentialities not previously contemplated or designated as a problem at all.

So called 'high' or 'big C' creative outcomes may be deemed particularly significant in the broader community, while 'everyday' or 'small c' creativity is considered valid and meaningful within the confines of one's own immediate experience. Historically, everyday creativity has been taken for granted, generally subsumed and overwhelmed by the results of more far reaching creative efforts applauded in recognition of important and long lasting contributions made to society. This is particularly evident where new and influential artistic concepts, or breakthrough scientific theories, or the invention and distribution of new technologies are attributed to the efforts of individual people. However, on a more mundane level, it is commonly understood that individual or collective creative effort can deliver alternate strategies for focussing attention, diverting interest and injecting variety into humdrum tasks or routine events. For example, the skin cancer awareness motto 'slip, slap, slop - slip on a T-shirt, slap on a hat and slop on the sunscreen' helped raise awareness in the Australian population of a specific public health issue encountered in daily life. Apparently insignificant creative initiatives can help mobilise whole populations to address larger and more intractable scientific, social or environmental problems as has been the case with the 'Clean up Australia' campaign to dispose of accumulated litter and rubbish from the landscape.

In this sense, creativity simply relates to how people engage constructively with the mechanisms of change that call for different, more efficient and possibly better ways of working, or the need to initiate innovative projects, products, processes or applications in the home, in business, in the community or in government. In a contemporary sense, creativity now has as much to do with communication and entertainment as is does with the world of work, and as much to do with spiritualism, culture and sustainability as it does with scientific discovery, innovation and entrepreneurship. Therefore, creativity is not restricted to cognition any more than it is restricted to one or other field of human activity. In most instances, notwithstanding computer experiments with artificial intelligence, creativity is considered to be a uniquely human, democratically distributed attribute that emerges in varying degrees when and where conditions are conducive. However, such an understanding of creativity has been slow to evolve as is demonstrated in the following brief review of creativity research that sources the origins of some spurious assumptions and key considerations.

Tracking the history of research on creativity during the 'great and nearly endless' debates of the eighteenth century, observing in the process that '…it was widely accepted that neither genius nor talent could survive in repressive societies', Albert and Runco (1999) identify:

> … four fundamental … distinctions, which were to become the bedrock of our present-day ideas about creativity:
> a) Genius was divorced from the supernatural;
> b) Genius, though exceptional, was a potential in every individual;
> c) Talent and genius were to be distinguished from one another; and
> d) Their potential and exercise depend on the political atmosphere at the time.
> (Albert & Runco 1999, p. 22)

The nineteenth century saw the rapid growth of rational scientific curiosity. The modernist quest to unlock the 'laws of nature' brought with it not only a formalisation of scientific research methods, but also a fascination with the potential for positivist intervention. Amid the promulgation of Darwinian notions of natural selection, linked to evolutionary adaptation for survival and the discussion of 'individual difference', Galton (1869) began researching human creativity. His declared aim was to explain exceptional creative achievement as an inherited human trait passed down as a genetic predisposition within prominent families, or what he termed 'hereditary genius'.

Investigation into Eugenics was another, perhaps less well-known, interest of Galton. Hypothetically, this implied a potential for social engineering to improve British scientific performance through positive discrimination in favour of individuals, who might be expected to show talent for scientific work, being selected and encouraged on the basis of family history. However, as Martindale (1999, p. 769) notes, Galton's thesis on hereditary genius proved weak from the outset, eventually being disproved by re-evaluation of the original research. Ironically, Galton's legacy indicates that creativity is not so much an inherited trait, but rather a potentiality in all people. Nevertheless, many of the false assumptions underpinning Galton's theory set the parameters within which preconceptions about creativity research developed throughout the twentieth century. In general, academic investigation of creativity is historically located within the modernist scientific research tradition. This in large part explains why the importance of qualitative issues involving personal beliefs, values, and individual attitudes, informed as they are by human emotions and motivations, were often only noted as peripheral aspects of research into 'creative thinking'. Fascination with supposedly objective investigations into the psychoanalytical, the psychological, the intellectual and the genetic predications toward creativity therefore dominated research effort in cognitive psychology and fueled academic debates on creativity over 'nature versus nurture' throughout late twentieth century.

In 1950, well-respected psychologist and academic J. Paul Guilford, retiring President of the American Psychological Association, challenged his colleagues to focus greater effort on understanding creativity as a critically important, but appallingly neglected aspect of human psychology. At this time he questioned an over reliance on IQ testing and suggested that creativity encompasses a far wider range of attributes that warranted serious research attention. Late twentieth century research into creativity is vast. As such it is beyond the scope of this dissertation to recount the sequence of academic investigation in full. Instead examination of some key considerations provide a framework of past understanding in both popular and academic spheres upon which a re-conceptualisation of creativity may begin to be constructed. The goal is to highlight a 'confluence' of different approaches (Sternberg, 1999, p. 10) as previously mentioned.

This strategy benchmarks points of convergence and overlap between existing views of creativity in order to expose critical gaps in contemporary understanding.

Various authors, many working in the field of psychology, have exhaustively surveyed the history of creativity research including among many others Sternberg (1999), and Runco and Pritzker (1999, p. xv) who noted at that time for example, 'Since 1960 over 10,000 research articles in creativity have appeared in hundreds of journals and periodicals. Over 600 books about creativity have been published in the 1990s'. Sternberg and Lubart (1999, pp. 3-15) discuss the extensive literature on creativity under seven headings including the mystical, pragmatic, psychodynamic, psychometric, cognitive, socio-personality and confluence approaches. From an educational perspective, Craft (2001) clusters the research on creativity under the themes of psychoanalytic, cognitive, humanistic and behaviourist approaches. Despite numerous scholarly attempts to analyse creativity from particular perspectives, the prevailing conceptualisation of creativity remains confusing because of persistent slippage between imposed definitional categories. This is due to a complex layering of assumptions accreted from the,

- mystical, psychodynamic and psychoanalytic traditions
- informal, populist and pragmatic approaches
- psychometric, psychological and cognitive viewpoints.

Creative attitudes and motivation are discussed here under these three headings to identify the residual influence and cumulative impact of prior efforts to pin down the nature of creativity as a human attribute. Tension exists between theory and practice, and between qualitative and quantitative considerations, manifesting the struggle between scientific and experiential perspectives on creativity. Both orientations suffer from a certain lack of substantiation. However, as will become apparent toward the end of this chapter, some of the most recent advances in neurological understanding seem finally to provide a means of refuting or reconciling long standing inconsistencies in the diverse theories of creativity.

Mystical, psychodynamic and psychoanalytical approaches to creativity:

The mystical approach to creativity sits outside the realm of science, in that it harks back to supernatural, religious and cultural worldviews. The mystical approach includes some of the earliest and still deep-seated beliefs that creativity is the result of heightened spirituality or divine inspiration. This view asserts that the motivation, the insight and the extraordinary capacities needed to be creative derive from a 'higher' plane, somewhere outside the human condition and over which the individual person has little or no conscious or rational control. In this context creative individuals are considered to have a 'calling', to have been chosen rather than made. Such people tend to be seen as willing but passive conduits for otherworldly revelations, exemplified by Plato's deference to the Muse. Where 'creation' is considered to be the prerogative of the gods, privileged access to some pre-ordained power to create is therefore often considered by others as a 'god given talent' or 'special gift'.

Interestingly, the sublime motivational aspects of creativity may to some extent also be seen to correlate with psychodynamic attitudes or drives such as creative passion, devotion, absorption, dedication and heightened persistence of purpose in what Amabile (1989) describes as 'love' for the work in hand. It also aligns with psychoanalytic emphasis on the role of the unconscious in creativity, as theorised by Freud, Jung and others (Elms 1999; Jones 1999). Equally the mystical approach to creativity feeds into the therapeutic, restorative and meditative uses of creative activities as an avenue for healing, enlightenment, self-knowledge and self-actualisation. Psychodynamic aspects of the mystical concept of creativity also potentially carry negative implications of self-sacrifice or some personal cost or psychological price to be paid for the reward of heightened creativity. Such costs or consequences can be identified with foregoing a 'normal' lifestyle and the need to adopt strict disciplines or submit to non-rational forces in return for creative insight. For example, this includes the notion that creative artists are destined to suffer frustration, torment, deprivation, and even endure insanity, starvation and untimely death, in order to bring forth masterpieces as works of 'genius'. Heroic tragedy taints this scenario when creative achievement is as likely as not to go unappreciated during the creator's lifetime, only to be posthumously acclaimed, thereby cheating the

artist of recognition, professional satisfaction and financial return from their efforts as was the fate of modernist painter Vincent Van Gough.

From the time of Aristotle creativity has also been linked with mental disorder or 'frenzied inspiration'. This was formalised in the twentieth century in the psychoanalytic theories of Freud and the identification of creativity with 'sublimated drives', 'adaptive regression' and suppressed sexuality. Such risks or tendencies have long been associated with obsessive and compulsive behaviour, with personality disorders or other mental illnesses, as well as substance abuse, commonly attributed to some fundamental weakness or undisciplined craving thought to be inherent in creative people.

Informal, populist and pragmatic approaches to creativity:

By comparison, pragmatic approaches to creativity derive directly from operational experience. They involve highly regarded and often very widely employed procedural techniques for intentionally stimulating and developing novel ideas that target specific applications in use. Pragmatic strategies for generating creative outcomes are fundamentally populist in nature, typically acquiring a following of adherents based on a widely accepted reputation for effectiveness and anecdotal reports of success in practice.

As such, pragmatic approaches to creative ideation flourish outside science and academia in that they are neither determined by nor concerned with substantiation from formal research. Many techniques have been developed and promulgated internationally in business and educational contexts. Some of the most well known and respected approaches include various applications of the concept of 'Lateral Thinking' by Edward de Bono (1970); strategies for 'Brainstorming' or 'applied imagination' developed by Alex Osborn (1953); and the techniques of Tony Buzan (1995) with 'Mind Mapping' or 'integrative memory technique' to name only a few among many.

De Bono's focus on lateral thinking, in the latter decades of the twentieth century, parallel much of the academic research activity into creativity. Internationally, De Bono's writing on creativity continues to receive very widespread popular acclaim and is therefore extraordinarily influential in practice. Commitment to the notion of lateral thinking, by individuals, business people and teachers, that is overtly or tacitly implemented across

broad community and education contexts far exceeds awareness of specific scientific findings from the concurrent academic research into creativity. De Bono's advocacy of the generative merits of various modes of creative thinking therefore constitutes a significant body of informal theory that might be said to amount to a widely accepted philosophy of practical wisdom on creativity. De Bono's numerous publications, high profile consultancy work with large multinational corporations and many speaking engagements and seminars provide a platform for promoting creativity in terms of pragmatic lateral thinking principles. As a private citizen, De Bono uses his reputation as impetus to develop and disseminate a range of actionable mental strategies, operational techniques or 'tools' for overtly promoting creativity at home, in the school or workplace.

De Bono recommends lateral thinking as a supplement, or complementary alternative, to the narrowly convergent or 'vertical' nature of deductive rationality that dominates science and is still all too prominent in most other aspects of conventional education. Instead, De Bono asserts that lateral thinking 'leads to changes in attitude and approach' by looking for different ways of generating new ideas and 'breaking out of the concept prisons of old ideas'. De Bono (1970) argues:

> … lateral thinking … is the process of using information (differently) to bring about creativity and insight restructuring. Lateral thinking can be learned, practised and used …there is no antagonism between the two sorts of thinking. Both are necessary. Vertical thinking is immensely useful but one needs to enhance its usefulness by adding creativity and tempering its rigidity. (De Bono 1970, p. 7)

Based on the notion that pattern recognition is fundamental to human cognition, and setting out the differences between vertical and lateral thinking, de Bono explains that lateral thinking is primarily divergent, concerned with generating richness by identifying multiple pathways and directions for looking at any given situation. Rather than being convergently analytical and rule driven, lateral thinking is speculative. It pursues more than one line of reasoning concurrently, often intuitively jumping stages in the thinking process and filling the gaps when and if required. Lateral thinking tolerates ambiguity, mistakes and dead-ends, making use of both positive and negative observations to advance overall thinking processes. Lateral thinking welcomes chance intrusions or disruptions, avoids fixed categorisation, explores the least likely option in search of new patterns and possibilities. While lateral thinking may increase the probability of finding a satisfactory resolution it offers no certainty, though it does make provision for answering

questions that may not have yet been formulated. In these terms, the process of lateral thinking does not assume or accept that only one correct answer already exists for every question. Instead, those engaged in lateral thinking seek to intentionally explore or devise different approaches to knowledge generation, meaning making and learning.

To activate the attitudinal components of creativity, de Bono (1985) developed the metaphorical notion of 'six thinking hats' designed to overtly promote role-play for deliberate and tangible translation of 'intention into performance'. This strategy provides a pragmatic opportunity for people to shift attitudes at will by voluntarily 'changing hats'. Different coloured hats provide a visual metaphor for different mental orientations. The white hat represents objective neutrality, corresponding to the dispassionate, rational and convergent analysis of verifiable facts and figures. The red hat involves intuition, beliefs and values, underlying feelings, aroused emotions and passion. The black hat is cautious, sceptical, concerned with risk factors and as such is potentially reticent, negative and defeatist. The yellow hat is positive, optimistic and proactive in looking for benefits, with little concern for the consequences. The green hat is symbolic of creativity because it signals growth and the fertility of new ideas. The blue hat has a meta-function, in that it is cool and expansive in attending to the 'big picture', providing the control, facilitation and organisational understanding required to synthesise and apply the resulting ideas for a specified purpose.

Osborn (1953) is renowned as the advertising executive who popularised the notion of applied imagination in a technique better known as 'Brainstorming'. This is a facilitated, collective, action-based strategy for prompting the rapid development of multiple ideas in response to a specific theme or problem. Brainstorming usually relies on groups of people working collaboratively in a conducive atmosphere of suspended judgement, whereby ideas may be contributed, mutually explored and expanded free from criticism. The process can be stimulated and enhanced by looking for alternate uses, adapting, modifying, magnifying, minimising, substituting, rearranging, reversing and combining ideas. Four rules govern the process of brainstorming spontaneous ideas, namely a prohibition on criticism, a conscious striving for unexpected or extraordinary concepts,

permission to build upon the ideas of others in what some call 'hitch-hiking' or 'piggy-backing', and a drive for quality improvement and excellence.

Brainstorming is primarily a group activity, originally designed to operate in a professional business setting such as a design office. It is intended to rapidly generate a wealth of raw material from which one or more solutions to a given prompt or problem can be collaboratively derived. Subsequent to the initial brainstorming session individuals may then work separately or in teams to progressively develop, refine, adjust, adapt and critique the ideas to evaluate the creative outcomes. Ideas generated in the brainstorming session are generally captured in a free flowing pattern of words, phrases and/or images that may be described as 'visual thinking', which lends itself to further manipulation in a variety of graphic or textual ways. Brainstorming is a technique that readily lends itself to educational settings and has been enthusiastically adopted in the facilitation of gifted and talented learning programs in schools. The merits of brainstorming reside in the focused nature of the problem to be addressed, coupled with adherence to a set of guidelines that model and promote enthusiastic and uninhibited participation, while guarding against the counterproductive impact of premature criticism or personal ridicule in a group setting. Brainstorming stimulates a non-linear approach to ideation and participatory problem solving that requires the full co-operation, enthusiasm and immersion of participants.

Using a not dissimilar principle of information management to that underlying brainstorming, Buzan (1995) developed an alternative to note taking initially for himself that was quickly refined for use by others. Mind mapping enables an individual to record or co-locate non-linear linkages in an information gathering process. First described as an 'integrative memory technique' the process is commonly referred to as 'Mind Mapping'. Like brainstorming, mind mapping uses words, images, symbols and colours to encapsulate the complex three-dimensional web of meaning that flows in and around information. Mind mapping is less concerned with detail than with conceptualisation or the relevant structuring of knowledge relationships. Originally intended as a simple means of recording information, mind mapping demonstrates the power of process

thinking and visualisation in developing and reconfiguring concepts, manipulating ideas, massaging information and building communication networks in creative ways.

A feature of mind mapping is the use of directional symbols such as arrows and connecting lines to indicate interaction between ideas and meaningful applications. Mind mapping has been adapted and expanded for group use, gaining wide acceptance especially in the corporate environment for strategic planning. It provides a useful means of mapping and communicating the development and flow of abstract relationships. Mind mapping accommodates multiple messages and complex meanings; as well as the configuration and process development involved in the management and exchange of information between people and technologies, and the development and distribution of products and services in a global market economy for example.

Psychometric, psychological and cognitive approaches to creativity:

Acknowledging that de Bono's concern is 'not with theory but with practice', Sternberg and Lubart (1999, p. 5) focus on the cognitive perspective when they equate de Bono's white hat with 'data-based thinking', the red hat with 'intuitive thinking', the black hat with 'critical thinking' and the green hat with 'generative thinking'. Interestingly, Sternberg and Lubart neglect to mention the yellow hat, perhaps because optimistic 'blue sky' thinking, characteristic of brainstorming and mind mapping activities, eschews scientific determinism in favour of faith in the vagaries of potentiality over verifiable certainty. Sternberg and Lubart also omit reference to the cognitive relevance of the blue hat, which might be said to indicate holistic or integrative 'organisational thinking'.

Taking up the more academic perspective, Albert and Runco (1999, p. 26-27) argue that the psychometric approach to measuring creativity statistically should be viewed in the context of Galton's early interest in hereditary ability, and the subsequent regime of intelligence testing initiated as early as 1904 by Binet and Spearman. Work toward developing and refining methods for testing intelligence, as cognitive ability, continued with Terman and his student Catherine Cox during the 1920s. Their aim was to apply Galton's conclusions to help identify 'children who would later achieve eminence'. The most often quoted conclusion of Cox's (1926, p. 218) data on creativity is that, 'youths who achieve eminence are characterized not only by high intellectual traits, but also by

persistence of motive and effort, confidence in their abilities, and great strength or force of character'. Albert and Runco (1999, p. 27) note that Cox's research coincided with the development of ego psychology representing one of the most significant contributions to psychological research into creativity prior to World War II.

As mentioned previously, Guilford was a prominent theorist who followed on from this early twentieth century research to have a very significant impact on shaping late twentieth century research into creativity. Conscientiously engaging in experimental psychology, he applied quantitative research methods to the psychometric investigation of creativity in relation to intelligence. After chiding members of the American Psychological Association in 1950 for their neglect of creativity, Guilford's subsequent research during the 1960s focused on creativity as a mode of 'problem-solving'. This established the groundwork for later educational investigations into problem-based learning discussed in the last chapter in relation to design education.

Guilford employed factor analysis to generate complex theoretical models as a basis for developing batteries of psychometric tests. These include the 1967 Structure of Intelligence (SOI) model illustrated as a 'trigram' or three-dimensional cube. In this theory of information-processing, Guilford allocates one of the three axes of the cube to differentiate five major intellectual activities described under 'Operations'. These operations are processed into one of four broad classes of information identified as 'Contents' on the second axis, resulting in any of six types of data that he calls 'Products' against the third axis. Included in Operations are the functions of cognition, memory, divergent production, convergent production and evaluation. The Contents axis is subdivided into figural, symbolic, semantic and behavioural sources of information. The Products axis includes outcomes categorised in terms of units, classes, relations, systems and transformations. Beginning as a 120-factor model this quickly evolved into 150 then a 180-factor model of intellectual abilities, though the original 120-factor model saw most research application as a tool employed by other theorists.

Guilford's intention was to provide a reliable means of isolating and selectively measuring various intellectual and other psychological abilities in test subjects. However, Michael (1999) suggests that efforts to use the SOI model merely served to indicate:

> … the simultaneous use of two or more abilities … one does not use one ability to the exclusion of another… (which) would appear to be particularly relevant in the instance of devising measures to assess various forms of creative endeavour… In about 1985, Guilford recognised that certain abilities tend to be correlated and represented essentially components of a more generalised or higher-order ability. (Michael 1999, p. 791)

Michael goes on to explain how throughout the 1970s Guilford developed a two dimensional iterative Structure-of-Intellect Problem-Solving (SIPS) model as a variation on the SOI model. Guilford distilled eight hypotheses for characterising creativity in relation to the SOI model down to five that he considered to be most important including 'fluency', 'flexibility', 'redefinition', 'sensitivity to problems' and 'originality', to which he later added 'elaboration'. Though committed to scientific method and the application of statistical analysis in the study of intelligence and creativity, Guilford's work was criticised because the empirical data he produced were not seen as sufficient to substantiate his theoretical constructs. Nevertheless, the abiding influence of Guilford's work is his conclusion that creativity represents a higher order operation of metacognition involving multiple abilities of which intellect is one among many. He initially promoted creativity as a mode of problem-solving, later drawing attention to the importance of sensitivity to 'problem identification and analysis' or what Getzels and Csikszentmihalyi (1975) refer to as the need to move the focus 'from problem solving to problem finding'.

Concurrently with the work of de Bono, Guilford also articulated the role of divergent thinking in creativity. He notes interrelationships between convergent and divergent modes of problem solving that operate differently in different disciplinary applications. This may have informed de Bono's focus on vertical and lateral thinking. Fundamentally, however, Guilford's work provided impetus for the once popular but now largely outmoded batteries of psychometric creativity tests developed by Torrance (1974). Along with standard IQ tests, Torrance's prescriptive and overly simplistic pencil-and-paper tests were widely administered in schools and scored against the four measures of 'fluency', 'flexibility', 'originality' and 'elaboration', derived from Guilford. The Torrance Tests of Creative Thinking were once employed to identify children for inclusion in accelerated or gifted and talented learning programs, and in the process served to promulgate the notion that creativity is not only readily identifiable but potentially teachable, albeit at a cognitive level.

This cursory review of creativity theory indicates the extent to which the cognitive analysis of creativity dominates scientifically predicated research. Research in cognitive science and experimental psychology brought to the fore a preoccupation with 'creative thinking' and the mental constructs or processes thought to be associated with memory, perception, visualisation and problem solving. Boden (1999, p. 357) explains how 'Computational psychology uses ideas from artificial intelligence (AI) to formulate its theories about how the mind works, and sees AI models as tests of the coherence and power of those theories… to throw light on creativity'. In this respect Simon and others sought to develop 'information processing' protocols and mechanisms to both explain and emulate a range of human abilities. Under the rubric of *The Sciences of the Artificial*, Simon (1969) developed highly influential 'models of thought'. Such modelling aimed to synthesise 'system principles', 'memory structures', 'learning processes', 'problem solving', 'rule induction and concept formation', 'perception' and 'understanding' (Simon 1979, p. xii). In psychology, Klahr and Kotovsky (1989, pp. xv) note Simon's radical, 'departure from the behaviourist "black box" approach that did not allow consideration of internal processes – the manipulation of symbolic structures – the focus of psychological investigation'. In particular, Simon and his teams of researchers investigated symbolic modelling for primary representation (or encoding) in relation to scientific reasoning and discovery processes that was readily assimilated into scientifically oriented design theory and research.

Not surprisingly this aspect of cognitive psychology reflects an extremely resilient Cartesian bias elevating mind over body and privileging conscious and rational intellectual control mechanisms over the emotional engagement and physical enactment of creativity in practice. While many old assumptions on which such conceptualisations of creativity are based have been rigorously challenged, or even disproved in recent times, persistent Cartesianism still influences the methodologies used to investigate creativity. For example, the psychological emphasis on metacognitive functioning, which represents the most prolific avenue of formal research concerning creativity, often carries forward certain psychometric interests. In many cases the statistical analysis of data obtained from a wide range of predetermined research activities is used to advance new or

revised theories of creativity. Sternberg and Lubart (1999, p. 7) point to the experimental work with human subjects of Finke, Ward and Smith (1992, pp. 14-20) as 'prototypical' in evidencing the theory, research and application of creative cognition. Paying particular attention to creative thinking and discovery, insight and innovation, Finke et al. focus on six considerations.

Firstly, they begin with the assertion that creativity involves many more than one type of mental process. Secondly, they set about distinguishing cognitive structures, affording particular attention to what they term 'preinventive structures' with subsets including 'novel visual patterns, object forms, mental blends, category exemplars, mental models, and verbal combinations'. Thirdly, the properties of these internal preinventive structures are said to relate to the processes of creative search and exploration as identified with various combinations of 'novelty, ambiguity, implicit meaningfulness, emergence, incongruity, and divergence'. The fourth consideration of Finke et al. separates the creative cognition leading to the initiation of a design idea, from assessment of the quality or value of that idea arguing:

> In some approaches to creativity and design, only the final product counts; however, it is crucial to know the cognitive processes and structures that are behind the idea… by attempting to relate properties of creative cognitions to those of the final products… that we consider important… (such as) originality, practicality, sensibility, productivity, flexibility, inclusiveness, and insightfulness. Establishing these connections helps one to develop a true, cognitive approach to creativity, as well as new, effective methods for teaching people how to generate creative ideas. (Finke, Ward & Smith 1992, p. 3)

The fifth criteria eschews what these researchers refer to as procedural or algorithmic problem solving strategies, preferring instead to examine the conditions governing creative discovery as a potentially useful means of overtly predicting creative performance. However Finke et al. readily acknowledge the caveat, 'By its very nature, creativity is not entirely predictable, though we believe that people can learn how to think in ways that maximise the opportunity for creative insight'. Sixth and last, they seek to deepen understanding of creativity across artistic, inventive and scientific domains by developing 'global information processing models' for creativity, proposing what they call the Geneplore model as 'a possible foundation for a unified account of creative cognition'. The term Geneplore encapsulates the two-phase generative and exploratory

nature of a cognitive cycle of creative thinking, where concepts may be adjusted in line with specific product specifications or project parameters, as follows:

> In the generative phase, one constructs mental representations called preinventive structures. These structures have various emergent properties that are exploited for creative purposes in the exploratory phase. The resulting creative cognitions can be fostered or expanded according to task requirements or individual needs by modifying the preinventive structures and repeating the cycle. Constraints on the final product can be imposed at any time during the generative or exploratory phase. (Finke, Ward & Smith 1992, p. 18)

Advocating the merits of the Geneplore model Finke et al. detail the importance of cognitive structures used to generate, explore, synthesise and interpret various creative processes. These include imagery and creative visualisation that underlie the invention of practical objects and systems, and the conceptual synthesis of abstract ideas and metaphors that inform literal and figurative combinations. Their examination deals with 'how imagination is structured by implicit assumptions and other forms of knowledge' in structured imagination. They also take into consideration the development and exploitation of exemplars, categories, schemas, mental models and naïve theories that guide or inhibit imagination. Looking at context in relation to memory retrieval they discuss fixation, incubation and insight in terms of analogical transfers, mental blocks, problem solving and product design. Finally Finke, Ward and Smith contemplate the mental constructs or strategies involving association, intuition, induction, transformation, synthesis and metacognition that are said to enable creative decision making.

Revisiting similar pitfalls encountered by Guilford and Torrance, the promised theoretical efficacy of the Geneplore model is seriously compromised by its reliance on formulaic experimental procedures used to test and evaluate creative processes under scientific conditions. The 'laboratory' procedures involve administering preconceived exercises evaluated against prescribed outcomes. Test subjects are presented with diagramatic shapes such as circles, cubes, parallelograms or cylinders with which they are asked to use their imagination to put together a variety of practical objects or devices, which are then rated by researchers for practicality and originality. While this sort of contrived test activity might be argued to be 'generative' under limited test conditions, it becomes highly problematic when the findings from such artificial tests are employed to try and

verify an independent level of spontaneous creativity. In defence of the scientific paradigm, Ward, Smith and Finke (1999) admit:

> We do not pretend to have the answer … but we do have the perspective that the capacity for creative thought is a rule rather than the exception in human cognitive functioning. We claim that (a) the hallmark of *normative* human cognition is its generative capacity to move beyond discrete stored experiences, (b) the processes that underlie this generativity are open to rigorous experimental investigation, and (c) creative accomplishments, from the most mundane to the most extraordinary, are based on those ordinary mental processes that, at least in principle are observable. (Ward, Smith and Finke1999, p. 189)

Research methodologies employed in other cognitive psychology studies extend beyond strict testing regimes and statistical analyses to include qualitative strategies that more broadly investigate and analyse feedback on the mental performance of average people and the exceptional abilities of prominent people. Some such research focuses on broadly based personal accounts of creative people selected on the basis of reputation and proven creative achievement or prominence in a selected discipline. This sort of approach is perhaps best exemplified by work undertaken at the University of Chicago by Csikszentmihalyi, who conducted a five-year videotaped interview program between 1990 and 1995 with ninety-one 'exceptional individuals'. The purpose of his study is to document and then analyse in depth the background, behaviour, reflections, perceptions and processes employed by creative people in generating original ideas. As noted earlier in this chapter, Csikszentmihalyi (1996) uses his findings to discount many myths about creativity arguing:

> … the idea or product that deserves the label "creative" arises from a synergy of many sources and not only from the mind of a single person. It is easier to enhance creativity by changing conditions in the environment than by trying to make people think more creatively. And a genuinely creative accomplishment is almost never the result of a sudden insight, a lightbulb flashing on in the dark, but comes after years of hard work… after several years of listening and reading, I have come to the conclusion that the reigning stereotype of the tortured genius is to a large extent a myth created by Romantic ideology and supported by evidence from isolated and – one hopes – atypical historical periods. (Csikszentmihalyi 1996, pp. 1 & 19)

Abiding complexity and incidental variability are common concerns that undermine both formal and informal theories of creativity. Many contributing aspects of creativity have been identified and some useful ideational techniques have been developed. However, no one approach to understanding creativity has so far proved satisfactory in accounting for creativity in all its manifestations. Perhaps the very notion of creativity would benefit

from re-conceptualisation taking other research and different qualitative factors into consideration.

Re-conceptualising creativity

Contributions from neuroscientific research represent another important avenue for investigating cognitive functioning. This provides a counterpoint to many of the overly narrow presuppositions of cognitive psychology. Neuroscientific insights are increasingly coming to inform and substantiate a more expansive qualitative understanding and re-conceptualisation of what constitutes human creativity at the individual and cultural level.

Clinical research findings, first analysing the impact of different sorts of brain damage, and later findings from non-intrusive magnetic resonance imaging of the healthy active live brain, indicate that creative functioning derives from holistic human experience. Experience is not purely cognitive. It includes feelings, emotion, interaction with other people and the environment. Creativity can no longer be seen solely as a product of a disembodied rational mind, with educational and research attention focussing only on 'creative thinking' processes. Rather creativity has been shown to exist as an integrated higher order multi-factorial human capability that encompasses the full spectrum of cognitive, affective and experiential considerations. Such holistic understanding also views creativity, not just as an individualistic stand alone function but rather, as a widely distributed human capacity best enriched when shared with other people and enacted in personal, community and cultural settings.

Neuroscientific evidence now illustrates, beyond any reasonable doubt, that feelings, emotions and attitudes play an indispensable role in informing intellectual analysis and shaping interpretations, judgements and decisions. Various inputs from and reactions of the body are processed in many different ways in multiple biophysical locations throughout the brain to motivate creative action. This substantiates intuitive belief in the subjective basis of enacted creativity that has long been shared as implicit understanding amongst designers and other creative practitioners. Therefore, from a theoretical and practical standpoint, creativity must be understood to involve much, much more than just objective 'thinking' processes that have preoccupied cognitive psychologists to date.

Post 1950 clinical evidence in this direction gave rise to highly influential theories attributing an important role to right brain hemispherical activity in creativity and visualisation, over the more dominant functions of language and logic thought to reside in the left brain region. What is commonly referred to as 'split-brain' studies involved testing the brain functionality of humans who had undergone a radical surgical separation of the two brain hemispheres as a treatment for severe epilepsy. These studies by the neuroscientist Roger W. Sperry and his students were conducted as part of the Cal Tech research group at the California Institute of Technology USA in the 1960s. Reflecting on the implications for education of his findings that the right brain hemisphere in humans specialises in Gestalt or holistic perception and the synthesising of non-verbal visual and other emotive information, for example, Sperry (1973) boldly asserts:

> The main theme to emerge … is that there appears to be two modes of thinking, verbal and nonverbal, represented rather separately in left and right hemispheres, respectively, and that our educational system, as well as science in general, tends to neglect the nonverbal form of intellect. What it comes down to is that modern society discriminates against the right hemisphere. (Sperry 1973, pp. 209-29)

In visual art and design circles such findings aroused considerable enthusiasm and academic curiosity in seeking practical applications of this neuroscientific information. Late last century this included attempts to redefine creativity and perception, in relation to art and design education, such as that promulgated by Edwards (1993, p. 29) in *Drawing on the Right Side of the Brain*. Herman (1994) is another popular author who provides a more general explanation of creativity in terms of left/right hemispherical brain anatomy in *The Creative Brain*. Amongst others, these two lay publications leverage basic plain English descriptions of the neuroscientific findings to discuss perception and creativity. Both Edwards and Herman aimed to bridge the divide between science and art by acting as interpreters or translators of knowledge from one 'language game' to the other. In different ways they attempted to shed light on the mysteries of 'what' creativity is and 'where' creativity might be found in the conscious or unconscious mind, which was assumed to be primarily situated in the right hemisphere of the physical human brain. However, as is so often the case, it has now become clear that left/right brain theory is overly simplistic and far from the whole story when it comes to explaining embodied creative engagement and the generative impulses that lead to creative productivity.

More recent work in neurophysiology and neuropsychology indicates a fundamental inseparability between body and emotion, healthy brain function and sensate and cognate activity. For example, Greenfield (2000) points to early observations of British naturalist Charles Darwin that emotional interpretation of human facial expressions is not a learned response, nor is it determined by cultural differences. Rather, in evolutionary terms, emotions manifesting as feelings are 'hard-wired' into the human brain and operate at all levels of consciousness to inform action. Greenfield (2000) explains:

> The question of emotions is one of the most important that a brain scientist, or indeed anyone, can explore. We are guided and controlled by our emotions. They shape our lives …emotional associations (produce) in the body tiny chemical changes… these somatic markers are a kind of intuition or gut feeling… emotion is made up of a whole landscape of chemicals and processes throughout the body that mesh with associations laid down in the brain. In this way, we can see that the old idea of primitive emotions erupting through a veneer of reason can be replaced by a more realistic scenario in which reason and emotion mesh together to different degrees at different times. (Greenfield 2000, pp. 106-121)

Expanding upon Gardner's construct of multiple intelligences, Goleman (1996) has dubbed the interrelationship between emotion and cognition 'emotional intelligence', arguing that 'it can matter more than IQ'. Drawing substantiation from a depth of research in neuroscience and psychology he asserts:

> … emotions… matter for rationality. In the dance of feeling and thought the emotional faculty guides our moment-to-moment decisions working hand-in-hand with the rational mind…In a sense we have …two different kinds of intelligence: rational and emotional… it is not just IQ, but *emotional* intelligence that matters. Indeed, intellect cannot work at its best without emotional intelligence…This turns the old understanding of the tension between reason and feeling on its head: it is not that we want to do away with emotion and put reason in its place… The old paradigm held an ideal of reason freed from the pull of emotion. The new paradigm urges us to harmonise head and heart. To do that well in our lives means… (understanding) what it means to use emotion intelligently. (Goleman 1996, p. 28-29)

Extrapolating implications for the present discussion of creativity as a higher order capability, it is worth following Goleman's line of argument a bit further. He points to emotional intelligence as 'the master aptitude', highlighting the important role of attitudes and motivation in learning, performance and the achievement of excellence. He argues the necessity of 'an emotional edge':

> … the degree that our emotions … enhance our ability to think and plan, to pursue training for a distant goal, to solve problems… define the limits of our capacity to use our innate mental abilities, and so determine how we do in life… (propelling) us to accomplishment. It is in this sense that emotional intelligence is a master aptitude, a capacity that profoundly affects other abilities … optimism predicts academic success… (Goleman 1996, pp. 80 & 88)

Noting the work of psychologist Albert Bandura from Stanford University, and echoing de Bono's associations with 'yellow hat' thinking in support of creativity, Goleman confidently asserts:

> Optimism and hope – like helplessness and despair – can be learned. Underlying both is an outlook psychologists call *self-efficacy*, the belief that one has mastery over the events of one's life and can meet the challenges as they come up. Developing a competency of any kind strengthens the sense of self-efficacy, making a person more willing to take risks and seek out more demanding challenges… This attitude makes people more likely to make best use of whatever skills they have – or to do what it takes to develop them. (Goleman 1996, pp. 89-90)

At this point the cross-referencing of attitudinal considerations in creativity finally begins to fold into a 'confluence' of ideas. In particular Goleman (1996) discusses Csikszentmihalyi's extensive research into high performance creativity in terms of the theory of 'flow and the psychology of discovery and invention' declaring:

> … to enter flow is emotional intelligence at its best; flow represents perhaps the ultimate in harnessing the emotions in the service of performance and learning… Flow is a state of self-forgetfulness… people perform at their peak while in flow, they are unconcerned with how they are doing, with thoughts of success or failure – the sheer pleasure of the act itself is what motivates them. (Goleman 1996, pp. 90-91)

Here, the observations of prominent neurologist Oliver Sacks (1997) are pertinent in re-conceptualising creativity. In his inaugural lecture to open the Centre for the Mind at the Australian National University in Canberra Sacks dealt with creativity, primarily from the perspective of clinical neurology, enriched by his own accounts of personal experiences as a doctor and writer. In his speech he refers to the observations of other clinicians and theoreticians and utilises the historical record of often cited (and rebutted) accounts of creative/innovative experiences attributed to famous writers, artists, mathematicians and scientists. What emerges is an intriguing insight into holistic creativity if the topic is considered experientially, as a complex and variable, multi-factorial and integrated human attribute. This constitutes a higher order capability that involves feeling and motivation and the exercise of creative attitudes and enacted processes, rather than just the generation of creative ideas and products or the associated personality characteristics. While the context of Sacks' commentary is broadly scientific, his approach is enthusiastically phenomenological in nature and his language and explanations are readily accessible to the non-scientist. Unlike the accounts of cognitive psychologists reporting

data from various empirical 'creativity tests' for example, Sacks anecdotally describes first hand examples of how he has gained personal insight into creativity. As such, his views on the importance of creativity are compelling:

> ... we don't have any way at the moment of studying the neurology of the imagination ... clinical neurology ... is only just now beginning to address itself to questions of sensibility, talent, skill, imagination, dreaming (and) consciousness. A great fuss is made about consciousness ... I think that the top is creativity, and ... creativity involves the depth of a mind, and many, many depths of unconsciousness... no mechanical picture of the mind will do... We must see the mind as constructing perceptions, images, memories ... and the ability to step back to a much deeper level of genuine creativity; genuine concept driven creativity that comes from the depths of the mind and the depths of the personality and the depths of the unconscious; and not just on the surface. (Sacks 1997, cited from 1998 ABC Radio National transcript pp. 1-4)

Here Sacks refers to many levels of creativity, separating conscious or surface creativity, from unconscious or deep creativity. This suggests potentially useful parallels with research into the educational concept of surface and deep approaches to learning. Ramsden (1992) for example describes the importance of qualitatively deep, meaningful and holistic student experiences, attitudes or approaches to learning that teachers need to understand better if they are to achieve what Whitehead (1967) described in 1929 as 'the imaginative acquisition of knowledge'. Sacks also distinguishes between the unconscious involved in automatic physical actions, the Freudian psychoanalytic unconscious, and the creative unconscious noting:

> ... a different form of unconscious is involved in creativity ... a much richer and stranger and more mysterious form of unconscious ... this unconscious self is not purely automatic, it is capable of discernment, it has tact, delicacy, it knows how to choose, to divine ... this creative unconscious ... is not the Freudian unconscious, nor is it the sort of physiological unconscious ... it's a special form of … creative unconscious ... (where) innumerable fragments, ideas, impressions, feelings ... are playing together, dancing, colliding, meeting, separating ... there is always some organising principle which is emerging and ... coagulating ideas. (Sacks 1997, cited from 1998 ABC Radio National transcript p. 6)

As Csikszentmihalyi (1996) observes in *Creativity: Flow and the Psychology of Discovery and Invention*:

> The real story of creativity is more difficult and strange than many overly optimistic accounts have claimed…Creativity is a central source of meaning in our lives for several reasons… First, most of the things that are interesting, important and *human* are the results of creativity… What makes us different – our language, values, artistic expression, scientific understanding, and technology – is the result of individual ingenuity that was recognised, rewarded, and transmitted through learning… The second reason creativity is so fascinating is that when we are involved in it, we feel we are living more fully than during the rest of life. (Csikszentmihalyi 1996, pp. 1-2)

By 'living more fully', in relation to what makes people 'interesting, important and *human*', the notion of creativity benefits in being liberated from purely self-conscious and individualistic applications. Creativity, at a collective or community level, lends itself to a more holistic re-conceptualisation in terms of what Susan Blackmoore (1999) describes as a 'meme'. A meme is an idea, skill, technique, habit, invention or technology that is shared between people, leveraging their collective memories and capitalising on both formal and informal modes of transmission. Memes are pervasive in that they are promulgated amongst people by imitation and learning within and across disciplines, generations and communities. Memes are thought to lie at the very heart of tradition, culture and change. Memes encapsulate the knowledge, practices and beliefs that characterise individuals and groups in all societies. In this sense memes encompass both mental constructs and practical applications with an independent and evolutionary quality that is as resilient as it is adaptive. Creativity qualifies as a meme, especially when making the transition from 'small c' individual creativity to 'big C' culturally significant creativity, bringing with it the capacity to affect significant and lasting change at the social and community level.

The diversity and the disseminating power of memes is self-evident in virtually every field of human endeavour involving the sustained, intergenerational and global spread of clusters of ideas and belief systems such as that governing developments in business, education, philosophy, science, the arts, religion, politics and sport. Cultural meme indicators and carriers in society are found in the juxtaposition, renewal and spread of different cuisine, costume, customs, ceremonies and the full spectrum of old and new technologies for example. British zoologist Richard Dawkins first coined the word 'meme' in 1976 to describe how Darwinian evolutionary principles can be shown to hold true in human affairs beyond a narrowly biological frame of reference that constitutes the life of an individual person. Dawkins suggests that, at a fundamental level, memes include 'tunes, ideas, catch-phrases, clothes fashions, ways of making pots or building arches'. This helps to describe how design operates in the world as a professional domain within which creativity is an essential motivating force or meme. It also helps to explain how designers use personal and collaborative creativity to influence and manipulate intermittent shifts in consumer societies at the surface level of styles, tastes and trends.

Designing is an intentional act that always carries with it the meme-based potential for bringing about significant, pervasive and longer lasting cultural changes via contemporary architecture, furniture or fashion design to name a just some amongst many design applications. As such, professional designers conscientiously trade in the emotive and cognitive as well as the enacted memetic nature of creativity.

Re-conceptualising creativity as a meme provides an extremely useful explanatory device. In many respects it helps to account for both the fascination of creativity as a topic in separate fields of research, as well as the resilience and potentially bewildering indeterminacy and variability characteristic of creativity in different disciplinary contexts. Taken collectively the extant research in the cognitive and behavioural sciences concerning creativity converges to underscore the degree to which creativity is a complex and multidimensional chameleon-like phenomena that by its very nature defies prescriptive scientific definition. Here, leading neuroscientist Antonio Damasio (2001) provides, not so much a definition, as a convincing set of insights into the likely source of human creativity and its operation as a higher order capability and meme. In the process, his work clarifies the relevance of a confluent research approach and not surprisingly confirms many threads from past theoretical investigations.

Damasio suggests that any discussion of creativity must take into consideration the broader scope of information on the topic derived from other disciplines outside neuroscience. In a seminal paper, Damasio (2001) adopts an evolutionary perspective, noting that the oldest decision making functions in the human brain exist at an unconscious level to deal with basic biological regulation of the body. This is supplemented by a more recent set of cognitive mechanisms that have evolved to deal with the myriad demands of personal and social interactions. The most recent decision making abilities are located in the cortices of the human brain to deal with a wide ranging 'collection of abstract, symbolic operations for reasoning, problem solving, language and mathematics'. Having established this in the earlier 1994 publication *Descartes' Error: Emotion, reason and the human brain*, Damasio (2001, p. 59) argues, 'When we witness signs of creativity in contemporary humans, we are probably witnessing the integrated operation of sundry combinations of these (decision making) devices'.

Discussing recent neuroscientific evidence, Damasio admits the role of 'nature', in that people are genetically imprinted and are certainly born with 'preset brain circuits' that regulate basic biological functions below the level of consciousness. The role of 'nurture' then supports what he describes as non-preset 'plastic' brain circuits, which are shaped after birth by individual 'activity-specific' experiences. Here various environmental encounters subtly shape malleable brain circuitry differently, and in particular ways, as different people pursue interest, aptitude and developmental competence in different fields of endeavour such as sport, music, visual art, design, science or language, to name a few arenas where creativity can be observed. Experience also has an impact on developing brain circuitry as a consequence of physical and environmental interactions that produce 'the social and cultural artifacts that we talk about when we discuss creativity'. In short Damasio (2001, pp. 59-60) explains how a propensity toward creativity is learned from experience. He dismisses the Cartesian separation of mind and body as a theoretical fallacy declaring that creative artifacts, '… cannot be reduced simply to the neural circuitry of an adult brain and even less to the genes behind our brains … That is why extremely reductionist views cannot capture all the issues we wish to understand when we discuss creativity'.

Interestingly, Damasio is confident in delineating an integrative set of seven composite requirements or preconditions for creativity. On examination, these seem to very loosely correlate with selected attributes identified long ago by Aristotle and more recently by various other theorists. These include:

1. Motivation and courage, i.e.
   - Ambition
   - Willingness (to take risks)
   - Ability to face criticism and rejection

2. Extensive experience and apprenticeship (after the work of Howard Gardner and others) encompassing critical attributes such as:
   - Expertise - or discipline knowledge, 'know how' ('*poiesis*' and '*praxis*')
   - Connoisseurship - or judgement and practical wisdom ('*phronesis*')

- Technical proficiency - or skills involving competence ('*techne*')
- Scholarship – or learning and research ('*theoria*')

3. Insight into the multifaceted workings of mind for:
   - Self – or self-knowledge as self-efficacy
   - Others – or interpersonal knowledge

4. Strong generation of 'representational density' i.e. 'ideational' ability or 'a very good imagination' ('*phantasia*') where:
   - Multiple representations and ideas are generated in the conscious mind
   - Images as ideas are stimulated from both internal and external worlds
   - Discernment underpins choices about what ideas/images/representations to retain or discard

5. Large capacity working memory to support:
   - Retrieval of multiple representations
   - Holding of ideas/images/representations 'on-line' in mind ready for applied use
   - Manipulation and application of representations in time, space and combination, which constitutes composition and visualisation or 'artistic editing'

6. Ability to recognise novel/original representations for what they are and especially identify those configurations held in working memory that are likely to elicit an emotional response in self and others. This requires:
   - Aesthetic judgement
   - Sensitivity to emotional criteria - or empathy
   - Execution of good selections
   - Discarding of irrelevant aspects

7. Sharply tuned decision making apparatus that involves:
   - Selecting what ideas/images/representations to retain, discard or adapt
   - Optimising possibilities for reliably achieving best results.

In this respect, Damasio's neuroscientific work with healthy live human subjects and those affected by neurological damage or disease, along with that of his colleagues, represents a watershed in re-conceptualising creativity. This research goes a long way toward substantiating, unifying and validating the many aspects identified to date about what creativity is thought to involve. It offers a multidimensional affective appreciation of creativity sufficient to qualify as a higher order capability that is suggestive of the underlying memetic function of creativity in motivating and sustaining human development. Suggesting that, '… there is no such thing as Kantian pure reason', Damasio (2001) characterises this level of 'higher' neural functioning as fully embodied where perception, emotion, memory, language, decision making and planning:

> … relate to the large-scale systems of the primitive brain (that is to those regions in the cerebral cortex and subcortical areas whose circuits support important mental processes)… the large scale systems which are made up of several macroscopic regions. At these levels, we have a better chance of making transparent connection with the sort of mental processes studied in the cognitive sciences, and with complex phenomena, such as creativity. (Damasio 2001, p. 60)

Before moving on from Damasio's work to discuss a philosophical and educational underpinning for creativity in the next chapter, it is worth noting that by his own admission his neuroscientific views on emotion, feeling and knowing are 'unorthodox'. This relates particularly to his assertion that, '… there is no central feeling before the emotion occurs, that expression (emotion) precedes feeling … 'having a feeling' is not the same as 'knowing and feeling', (and) that reflection on feeling is yet another step up…'. Damasio explains how the various neural systems do not operate independently from one another but in concert, demonstrating both forward and backward connections in an iterative pattern of brain activity.

In particular, he describes how the 'associative cortices', that activate and deactivate neurones in the brain, support the capacity of working memory. An explicit and detailed 'dispositional representation' or image of a face that we see in front of us for example is held in working memory. This allows learning in 'dispositional mode' and retrieval of such images using recall. At the same time a different 'group of cortical areas' in the brain called 'pre-frontal' can concurrently hold what Damasio calls an 'acquired' dispositional representation of the face. This acquired dispositional representation is less focused on the details of the face and more concerned with establishing the 'relevance' of

encountering that face for the entire system or organism. It is this other capacity that determines whether one recognises the face as friend or foe, and in the process triggers the release of chemical transmitters that initiate the appropriate emotional response and bodily reaction. Such associated responses and reactions are learned and remembered. Most importantly from a design education perspective, Damasio (2001) concludes:

> In the context of art and creativity, … (this) is especially relevant. The brain is probably designed to respond with an emotional signal when it encounters certain stimuli – for instance, certain colours and combinations of colours, certain tones and their combinations, certain shapes or their combinations. The emotional responses, which are an ingredient of the aesthetic experience, are first triggered by those stimuli which lend themselves naturally to an emotional response. Later however, by means of an associative process, individuals learn to extend such emotional responses to many other stimuli. (Damasio 2001, pp. 67-68)

If this is so, it seems reasonable to assume that where this associative processing shifts through repeated experience to become familiar and consciously action-oriented, rather than a subliminal automatic response, it is potentially susceptible to overt training and the educative processes of teaching and learning through practise. In this way a novice designer's thoughts, emotions and body can be trained toward actualising particular levels of expert achievement, much as the thoughts, emotions and body of a musician or athlete are trained through practise to optimise performance.

Damasio explains how this works in terms of the notion of a 'body loop', as a principle operating behind the mutually interdependent relationship between mind and body. This 'body loop' results initially in actual physical symptoms indicating somatic pleasure flowing from an aesthetically satisfying experience. Damasio points out that 'body loop' reactions are observable in changes to ' … skin conductivity, heart rate, breathing rhythm'. However, through the 'associative process' mentioned above, it is possible with repeated aesthetic or other experiences to recall the mind/body relationship and bypass the actual somatic responses to achieve what Damasio refers to as the 'as-if body loop'. This is an experiential process of learning and refining creative responsiveness that is highly likely to be assisted by informed pedagogical strategies. As such it denotes creativity as a higher order adaptive capability. Therefore, creativity should be able to be reliably targeted and successfully taught, provided that the underpinning associative mind/body processes involved in creativity in the learner are well understood by the teacher, who has acquired this knowledge through having felt the lived experience of

being personally creative themselves. This aspect of creativity will be explored more fully in relation to philosophy and education in the next chapter. But first it is important to register the conclusion of Damasio (2001) that:

> Creativity itself – the ability to generate new ideas and artifacts – requires more than consciousness can ever provide. It requires abundant fact and skill memory, abundant working memory, fine reasoning ability, language. But consciousness is ever present in the process of creativity; not only because its light is indispensable, but because the nature of its revelations guide the process of creation… In a curious way, whatever we do invent … is either directly mandated or inspired by the revelations of existence that consciousness offers us. Moreover, … the inventions have an effect on existence as revealed, they alter it for better or for worse. There is a cycle of influence – existence, consciousness, creativity – and the circle closes. (Damasio 2001, p. 68 citing Damasio 1999)

Pivotal in all the preceding discussion of creativity is a strengthening understanding of the critical influence of lived experience, environment, values, emotion, motivation and the inclination to explore the unknown. Where this is coupled with the psychological, as well as practical, confidence and opportunity for creative engagement and action, research has largely refuted any suggestion that creativity is purely genetically predetermined and therefore mystically based and unsympathetic to pedagogical influence. Instead, a very substantial body of conflated research now confirms that creativity is a general human potentiality and a context dependent behavioural attribute that can be learned informally from life experience, or indeed broadly enhanced, or specifically engendered and facilitated through targeted teaching. Of core concern is the realisation that creativity is not merely a random cluster of descriptive characteristics, personality traits or habits to be mimicked. Rather, a commitment to creativity must be holistically integrated and mutually reliant on conscious and unconscious attributes of mind and body, operating in an iterative manner to progressively expand the creative learning potential and performance of each individual in a particular discipline, such as design.

Therefore scope exists for creative development in all people if conditions are favourable. Evidence suggests that creativity flourishes in conducive social environments where creative attitudes, initiatives and outcomes are overtly valued and promoted. Where respect for and appreciation of creativity are shared amongst communities then creative capability has the capacity to transcend individual human circumstances to become a self-perpetuating 'meme' within, and potentially beyond, the social fabric of its time. This re-

conceptualisation of creativity provides a springboard for the next chapter where the embodied issues involved in educating for creativity are discussed in detail.

Ultimately, by embracing an experiential or whole-of-life perspective that admits the importance of emotions, attitudes, values and beliefs in a qualitative sense, creativity starts to become more educationally accessible for both teachers and learners. Central to this realisation is appreciation of the pedagogical importance and growth of creative self-confidence and self-efficacy. Motivation and conviction to strive for creativity in life, learning and work seems to turn on the relative impact and quality of interpersonal relationships. These are the formative relationships between children and parents, teachers and learners. They also include peer relationships at home, school, college and university as well as the professional relationships established between novices and experts in relation to individual adult learners and practitioners, and the networks of specialist groups, fields or domains in creative disciplines such as design. This is what Etienne Wenger (1998) refers to in terms of learning, meaning and identity as 'communities of practice'.

In this chapter intersections between a vast array of existing creativity research have been very broadly correlated and compared. This helps to expose certain gaps and fallacies, and clarifies the overlaps and confluence of theoretical interpretations of creativity. Prevailing conceptualisations and a proposed re-conceptualisation of creativity were examined in an effort to improve understanding of what creativity is in preparation for an in depth analysis of creativity, philosophy and education in the next chapter.

…………………….

Chapter 6:

<u>CREATIVITY, PHILOSOPHY & EDUCATION</u>

Having established in the previous chapter foregoing psychoanalytical, psychological, psychometric and neuroscientific precedents, that inform a more expansive understanding of creativity, further theoretical extension is provided in this chapter. Concurrent philosophical and educational theories, relevant to this discussion of creativity, are examined in an effort to demonstrate a theoretical nexus that better balances objective scientific and subjective interpretive considerations. In particular, a brief metaphysical analysis of the attitudinal, emotional and physically embodied aspects of creative action supports a more holistic view of creativity as authentic and situated lived experience for both teachers and learners. The philosophical and educational discussion of creativity folds together insights about affective means, motivation and creative outcomes in socially situated design contexts.

By nature, philosophical discourse often makes very particular use of language in carefully constructing complex reasoning that can be conceptually demanding for the uninitiated to follow. Therefore the composite analysis and extrapolation provided in this chapter refers at some length to the texts of the philosophers cited. Since the issues under discussion are challenging, whole philosophical ideas are quoted in full, along with certain supporting explanation, lest the richness of meaning and the subtlety of interpretation encapsulated by writers such as Merleau-Ponty be lost or impoverished in paraphrasing. Holistic notions of 'praxis' and embodiment are explored at some length in an effort to integrate the theory with the practice of creativity. It is argued that there is a fundamental need in design education for synthesis between propositional and operational or experiential knowledges. This synthesis is dependent upon heightening student and teacher awareness of embodied perceptions and the flow of consciousness that necessarily

links skilled action with practical judgement and critical reflection in an iterative cycle of intentionally enacted creativity.

Selected philosophical perspectives are drawn from both American and European traditions. This includes ideas taken from various phenomenological treatises that assist in broadly positioning and explaining the pedagogical relevance and potential educational accessibility of creativity from a subjectively experiential and 'prospective' or overtly future oriented viewpoint. In particular, the philosophical perspectives of Richard Bernstein, Alfred Schutz, Martin Heidegger and Maurice Merleau-Ponty are examined in conjunction with parallel educational theories espoused by Lev Semenovich Vygotsky and John Dewey among others.

Coupled with the discussion in previous chapters, the concepts of 'praxis', human agency, embodied dispositions and practical reasoning presented in this chapter represent an irrefutable weight of scientific, philosophical and educational evidence to support the proposition that creativity is a fully embodied higher order human capability. Furthermore the confluence of this research demonstrates how and why creativity is reliant upon the holistic educational integration of heart, head and hands in teaching and learning processes in design. Critical determinants for the educational stimulation of creativity would appear to depend more on teachers overtly establishing a situated attitudinal environment or 'space' that is conducive to creative learning, than on the programmed transmission of specific content knowledge or technical skills stipulated in a curriculum. To engender creativity the learning environment or metaphorical 'space' must value holistic physical, mental and emotional engagement and promote self-determination, while also encouraging collaborative creative endeavour in life, learning and teaching.

Given the increasing congruence of research perspectives on creativity from science, the humanities and pragmatic sources throughout the twentieth century, it is now possible to examine creativity in holistic terms as a higher order human capability, utilising an interpretive research perspective. Turning to certain philosophical considerations, many of which predate later scientific substantiation, the underlying meaning and relevance of creativity in terms of embodied learning starts to become apparent. This approach helps to differentiate the constituent creative knowledge, skills and attitudes relating to design

practice that potentially offers scope for overt educational intercession. In general, a philosophical approach draws attention to the need for design practitioners, teachers and learners to better understand the experience and embodied physicality of creative action, with an emphasis on matters of emotion, motivation and embodied disciplinary practice. Theoretical concern can then shift onto consideration of the primary means by which tangible creative outcomes or design ends are brought from concept to fruition through praxis.

Understanding praxis and action – after Bernstein

The work of Bernstein (1999), as well as that of Lakoff and Johnson (1999), provides a point of entry into the philosophical discourse about creativity. Bernstein, along with others noted later, probes beyond the scientifically narrow research parameters of psychology and physiology in search of a deeper appreciation of human creativity in practice.

In large measure, the philosophical perspective has often been neglected or indeed negated in past scientifically predicated research into the nature of creativity. Increasingly, the importance of experience and embodiment, as well as the socially situated nature of creative learning and practice, is being acknowledged. This realisation constitutes a vitally important missing conceptual link that is needed to unify and make sense of other partial findings on the nature of human creativity and assumptions about how it operates in the world. In this sense, philosophical theories of lived experience and embodiment are indispensable in articulating the corporeal enabling conditions that underpin and facilitate the enactment of creativity in practice.

For teachers to achieve a better understanding of creativity from an educational perspective, it is essential that they first develop an overt experiential sensitivity toward the holistic nature of embodied action. In particular, unpacking an experiential approach to creativity focuses pedagogical attention onto the affective sphere in education where qualitative values, attitudes, feelings and especially the emotional responses of creator, client and community come to the fore in design practice. With respect to design knowledge and technical skill development in an educational context, experiential

understanding is additional to necessarily coming to terms with the procedural and practical impact of material, logistical or environmental factors. So too is it additional to exercising the more abstractly intellectual or supposedly rational attributes associated with creative ideation, problem identification and problem solving strategies. Experiential understanding derives from 'felt' perception and emotion. Creative action or engagement informs the associated abilities that design teachers, design students and design practitioners must employ to creatively investigate, analyse, synthesise, evaluate and otherwise judge information in use for design applications.

Bernstein (1999) analyses four different views of human activity against the relative priority and merits attributed to theory and practice within the philosophical traditions of Marxism, existentialism, pragmatism and analytic philosophy. Firstly, Bernstein critiques the notion of praxis as presented in the influential philosophies of Hegel and Marx. Secondly he explores consciousness, existence and action as dealt with in the philosophies of Kierkegaard and Sartre. Thirdly Bernstein discusses action, conduct and inquiry with a particular relevance for education as expounded by C. S. Peirce and Dewey. Fourth he looks at the 'concept of action' as an alternate dialogue in analytic philosophy.

Acknowledging the historical tension between philosophy and science, Bernstein notes the contribution of many other prominent philosophers, informing theoretical discourse in the late nineteenth century and throughout the twentieth century. This includes reflections on the impact of Descartes, Kant, Heidegger, Wittgenstein and Richard Rorty to name but a few. In particular, Bernstein's investigation into praxis and action draws a sharp distinction between the shared nineteenth century heritage of Marxism, existentialism and pragmatism and the quite radical departure favouring scientific empiricism and logical positivism of analytical philosophy. Most importantly for this discussion of creativity, Bernstein (1999, p. 231) cautions against scientifically predicated bias as was the case with '… early positivists (who) celebrated the end of metaphysics and speculative philosophy; (by condemning) to historical curiosity the meaninglessness, mistakes and superstitions of two thousand years of philosophy'.

The dominance of scientific thought and processes throughout the mid to late twentieth century mirrors the expansion of research interest shown in human creativity as a generically quantifiable psychological trait within the cognitive sciences. Yet Bernstein (1999) shows how, by the closing decades of the twentieth century, decline in adherence to the positivist viewpoint made way for a different understanding of 'action' in that:

> … the dialectic of analytical philosophy itself has brought us to a renewed sense of the complexity and variety of philosophic issues that need to be confronted. Concerning the concept of action… many different lines of enquiry in analytic philosophy have brought us to an appreciation of how deeply… (human) action is embedded in and conditioned by social practices and institutions. We cannot even begin to make sense of what we mean by action unless we consider how specific instances of actions are embodied in social practices and institutions that shape our lives. (Bernstein 1999, pp. 302-303)

While it is impossible to do justice to the full scope of Bernstein's philosophical scholarship, some specific points of explanation are pertinent to this discussion of creativity and design education. Delineating matters of theory and practice, Bernstein reflects upon the meaning of the ancient Greek term '*praxis*' in relation to 'action', 'doing' or 'performing' and 'practice'. He notes Aristotle's association of praxis with a disciplined, ethical and political freedom of action, and compares praxis with other ancient concepts such as '*theoria*' or what Bernstein equates with 'knowing for its own sake'. Broadly speaking '*theoria*' translates into theory or propositional knowledge often characterised as 'knowing that'. Subsets of praxis are then explained, first in terms of '*poiesis*' and then '*eupraxia*'. '*Poiesis*' is said to designate a form of 'making' not dissimilar to the 'know-how' used in design or other forms of creative practice, evident in such activities as building a house or writing a play. '*Eupraxia*' introduces a qualitative consideration, indicating a commitment to excellence where design activity or praxis must be 'performed well'. In short, Bernstein associates praxis with applied knowledge and practical wisdom designated by the Greek term '*phronesis*'.

Summarising the Aristotelian view of education Reeve (1998) explains:

> … in Aristotle's view, human beings are psychological organisms, whose psyches or souls are responsible for their life and characteristic functioning. These souls have both a rational component, which is the locus of practical wisdom (*phronesis*) and intellect (*nous*), and a non-rational component, which can be influenced by reason, and which is the locus of appetites and emotion… An action or activity (*praxis*) expressing practical wisdom is paradigmatically (though not always) the result of a decision (*proairesis*), which is a desire based on deliberation (*bouleusis*) and wish (*boulesis*) … a rational desire for happiness… Before we begin to deliberate at all, however, we have to be presented with a practical problem to deliberate about… Often … it is not our appetites that present us with practical problems but the situation in which we perceive ourselves to be. And one important way

> situations bring themselves to our attention is through our emotions and feelings… The reason our emotions are modes of practical perception – or ways we perceive situations requiring deliberation and action - is that, though they typically involve sensations and somatic disturbances, there is more to them than that: they also essentially embody beliefs and desires. (Reeve 1998, pp. 52-53)

According to this analysis, creativity may be characterised as an aspect of design praxis that involves the exercise of practical wisdom or *'phronesis'*. Lived experience of creativity is informed by feelings, desires and beliefs that inevitably arise from interacting with other stakeholders in the design activity, and/or engaging with a practical design opportunity. Clearly, creative design praxis encompasses the uniquely human experience of locating oneself within a particular design-related situation in order to feel and respond emotionally as well as intellectually to the circumstances. The 'situatedness' of the design experience occurs, for example, when an interior designer inspects the internal spatial qualities of a physical building site. Similarly, when a graphic designer logs into the digitised reality of a computer interface, or where a fashion designer physically fits a garment to the curvature of a live human body there is a specificity and very particular context governing their actions. As specialist disposition, impetus, subject or task action Buchanan (1995 & 2001) takes up the classical notion of *'topoi'* to locate situated design 'topics', 'places' or themes that give rise to 'invention', 'discovery' and 'creativity', thereby offering new theoretical interpretations for a 'rhetorical study of design'.

In a contemporary context Bernstein (1999) articulates a critical difference between the qualitatively rich and situated notion of praxis and the more pedestrian definition of 'practice' where active and applied learning in design for instance is interpreted as a routine process, operational or technical procedure, or job of work:

> … we can detect an important ambiguity revealed by the disparity between Aristotle's meaning of "praxis" and the English translation "practice". For "practice" and its cognate "practical" call to mind some mundane and bread-and-butter activity or character … interested in the "practical" or "material" things of life… The ambiguity of what we might label the "high" and "low" senses of "practical" has been the source of innumerable confusions, even among philosophers. When, for example, the pragmatists emphasised the role of the "practical" in human life, they were primarily developing a category derived from the "high" sense of practical; they were close in spirit to Aristotle's "praxis". But many of their critics – either out of ignorance or malice – have interpreted them as sanctifying the "low" sense of "practical". (Bernstein 1999, pp. xiv-xv)

Dewey's work endured such criticism. Precisely the same ambiguity over the practical implementation of creativity in action fuels the ongoing definitional confusion and debate over the nature, role and relative importance of creativity in education, outlined in earlier

chapters. As a result, higher order requirements for integrating contextual, intellectual, physical, emotional and attitudinal aspects of holistic creative capability have very often gone unattended in teaching and learning situations. This is especially so whenever attempts are made to reduce creativity to linear procedural knowledge of creative thinking techniques or where creativity is otherwise characterised as simplistic processes or atomistic skill sets such as those often associated with lower level competency development involving instrumental tasks.

Bernstein (1999, pp. xvi-xvii) contemplates differing philosophical interpretations of action and practice including the pragmatic 'practical philosophy' or 'philosophy of practical activity' articulated by Dewey. In the process Bernstein shows how, despite a declared disdain for traditional philosophical questions, analytical investigations into causation after Wittgenstein came to 'signify a complex web of issues in understanding "intention", "motive", "purpose", "reasons", and "teleological explanation" (of action)'. Hence, as a particular form of innovative action, creativity is inextricably linked to the operation of Aristotelian 'virtues' in design as *'praxis'*. Matters of *'phronesis'* as practical wisdom, *'poiesis'* as making and production, and indeed *'phantasia'* as appearance or imagination are all critical affective considerations for design teachers and learners in linking sensation with belief and the role of visual and interpersonal communication. In this respect Bernstein (1999, p. xvii) emphasises the value of the philosophical perspective suggesting in particular that, 'If we turn to Europe… we discover that in the phenomenological movement, especially in existentialist thought, the central issue again turns out to be the nature of human action'. Selected aspects of existentialist theory help to explain exactly how corporeal design knowledge is translated into design action as a means of realising creative design concepts. This indicates how cognitive strategies depend upon the integration of mind and body when identifying and resolving aesthetic possibilities and reconciling technical problems. Skills are not reducible to mindless practical dexterity. Skill acquisition, particularly in the development of expertise, is heavily reliant on motivation, planning, performance and applied knowledge. This calls for confidence in choosing, applying and adapting ideational techniques, exploring concept development strategies and enacting iterative design behaviours encompassed within the practical action or physical exertion involved in the holistic 'doing' of design.

Therefore it is reasonable to suggest that a vital component for creative teaching and learning in studio based design education must involve stimulating relevant affective responses in students as they learn to 'do' design. This includes a desire and willingness to act in the combined application of different sorts of knowledge and skills, including self-knowledge as well as practical or theoretical discipline knowledge. For both teacher and learner, this requires an awareness of certain freely 'associative' enabling attitudes and creative abilities, noted by Damasio and referred to in the previous chapter. This permits a creative dialogue and facilitates creative interaction in the classroom. It also provides the sort of conditions needed to achieve what has already been referred to in terms of Csikszentmihalyi's psychology of discovery and innovation, or 'flow'. At issue here is the holistic embodiment of designers in the design processes required to enact (rather than just think about) creativity.

Lakoff and Johnson (1999) take up precisely this type of consideration when examining the far-reaching philosophical implications of 'embodied realism'. From the outset, they acknowledge a substantive debt to both Dewey and Merleau-Ponty who they consider, '… saw that our bodily experience is the primal basis for everything we can mean, think, know and communicate'. Noting what they describe as overwhelming evidence that, ' … reason and emotion go hand in hand, with reason possible only if emotion is present', Lakoff and Johnson identify at least three levels of embodiment. These they call the neural, the phenomenological conscious experience, and the cognitive unconscious levels explaining:

> Neural embodiment concerns structures that characterise concepts and cognitive operations … (like) colour (and) models of spatial relations …The phenomenological level is conscious or accessible to consciousness … (and) consists of everything we can be aware of, especially our own mental states, our bodies, our environment, and our physical and social interactions. This is the level at which we speak of the "feel" of experience, of the way things appear to us, and the qualia, that is, the distinctive qualities of experiences such as … the taste of dark chocolate, the sound of a violin, or the redness of a ripe … cherry… The cognitive unconscious is the massive portion of the iceberg that lies beneath the surface, below the visible tip that is consciousness. It consists of all those mental operations that structure and make possible all conscious experience… These three levels are obviously not independent of one another …People are not just brains, not just neural circuits. (Lakoff & Johnson 1999, pp. 102-104)

In many respects Lakoff and Johnson venture further than most previous researchers in conscientiously bringing science together with philosophy in an attempt to specify the

intangible qualitative basis of sensory 'appreciation' and imagination. Inevitably this interpretive understanding of human experience raises many ontological questions concerned with the nature and philosophy of 'being'. In this respect various phenomenological treatises help in teasing out the inherent complexity of creativity as a higher order capability. For example, the philosophical works of Schutz (1899-1959), Heidegger (1889-1976) and Merleau-Ponty (1908-1961) are dealt with in turn. Together they offer profound insights into creativity that potentially render it more susceptible to educational interpretation and intercession.

The phenomenological perspective provides a challenging but rewarding theoretical frame of reference for interrogating the lived experience of 'being creative', indicating how creativity might be better implemented at a holistically integrated attitudinal, intellectual and practical level in design education contexts. Schutz scrutinises the social context of human action within the life-world. Heidegger formally investigates the notion of 'being' in considerable depth to offer a remarkably lucid explanation of how learners assimilate embodied experience as they move from novice to expert through the enacted application of knowledge, skills and attitudes involved in 'making'. Merleau-Ponty (1945) delves into the realm of art and design perception, in an attempt to unravel and explain the notion of human embodiment in overtly sensate and experiential terms, offering a profound analysis of creative reciprocity and physicality:

> Probably the chief gain from phenomenology is to have united extreme subjectivism and extreme objectivism in its notion of the world … The phenomenological world is … the sense which is revealed where the paths of my various experiences intersect, and also where my own and other people's intersect and engage each other like gears. It is thus inseparable from subjectivity and intersubjectivity, which find their unity when I either take up my past experiences in those of the present, or other people's in my own … (Merleau-Ponty 1945, pp. xix-xx)

Here Merleau-Ponty deftly sets the philosophical parameters for this discussion of creativity by arguing the relevance of adopting a phenomenological perspective.

Social relevance, subjectivity and intersubjectivity – after Schutz

Schutz is numbered amongst the founding members of the International Phenomenological Society with a particular interest in the sociological relevance of phenomenological research and theory. He examines the phenomenological psychology

of Edmund Husserl (1859-1938) in relation to the sociological theories of Max Weber (1864-1920). Schutz pays particular attention to issues of human experience in the 'life-world' in terms of interest, observation, orientation, interpretation, intention/volition, motivation and action in the sociological contexts of everyday circumstances and activities. Central to the analyses of Schutz is the critique of 'intersubjectivity' or examination of the nature of mutual understanding in interactive social relationships, and especially how this is thought to influence the social distribution of knowledge. According to Wagner (1970) Schutz emphasises that:

> … the subjective meaning of a person's membership in his (her) community… springs from … efforts of the individual to achieve a definition of his (her) place … (and) general role within the community and especially within the various subgroups to which he (she) belongs… unity of outlook depends on belief of members of the community that they share their views about the world … using the same standardised expressions and formulations when applying (or) explaining those views … the individual, in his (her) orientations within the life world, is prodded and guided by instructions, exhortations and interpretations offered by others … if the individual constructs their own view of the world … it is with the help of the raw materials offered to him (her) in this constant exposure to other people … Both the exposure to these cultural materials and their selective and interpretive acceptance of them presupposes a common language as a means of communication between persons, as well as an instrument of cognition for the individual. (Wagner 1970, p. 16)

Schutz's discussion of socially constructed identity, belonging and membership to a community of like minded people in a work context pre-empted the more recent work by Lave, Wenger and others regarding situated learning and 'communities of practice', which are issues taken up in the next chapter. In particular, the references here to 'belief', and shared views about the world in communities and subgroups, throws into sharp focus the importance of cultivating creative attitudes as a 'common language' within design and design education. Furthermore Wagner suggests:

> In any given situation what is formulated, communicated and understood is only a fraction of what could be noticed. Not everything present in a situation is relevant to the persons involved in it. In fact, some factors in a situation impose themselves upon the actors and thus constitute imposed revelances. Others are singled out by the individual as important 'now', to assume … volitional relevance… 'Problems of relevance' such as these occupied Schutz's attention in the very last years of his life. In addition to 'imposed' and 'volitional' relevance, he analysed three distinct kinds of relevances i.e. motivational relevance, thematic relevance and interpretational relevance. (Wagner 1970, pp. 18-19)

In this context, the higher order capability associated with creativity, and the attitudes needed to engage in educational exchanges predicated upon creativity, are seen to involve stimulating a volitional interest in creativity and establishing its motivational and interpretational relevance for both teachers and learners. Creativity without this

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contextual relevance and attitudinal positioning, and certainly without the willing acceptance of the learner, remains 'imposed' and therefore can present very real difficulty for some individuals who are reluctant or unwilling to engage with the creative opportunities on offer in design education.

As previously argued, it is difficult to discuss creativity meaningfully wherever Cartesian assumptions stubbornly persist in education. The acceptance of certain phenomenological insights into the experiential nature of both creativity and learning provides an alternative, flexible, qualitatively oriented, theoretical framework for contemplating the topic of creativity in relation to design education. A phenomenological orientation is particularly useful in laying the groundwork for a more person-centred worldview focusing on various aspects of subjectivity and intersubjectivity in education, along with the acceptance of multiple and shifting perceptions of meaning in design. Significantly, such a theoretical approach is tolerant of ambiguity, specificity and reciprocity in how human beings interpret and interact with both their internal and external worlds, and with the internal and external worldviews of other people. This perspective also readily accommodates certain inconsistencies and differences in individual and occupational interpretations of what constitutes creativity for the purposes of design education. The relationship between the practitioner, the teacher and the learner of design may therefore be understood in terms of subjectivity, intersubjectivity and reciprocity. Design is a highly contingent and reflective endeavour primarily based on visual perception, analysis, judgement and negotiation on practical outcomes. Design calls for sustained creative engagement with not only the design themes, tasks and problems, but also with the competing aspirations and co-operative needs of all the stakeholders in the design process – including oneself. Understanding and shaping the nature of this holistic creative engagement is therefore critical to effective design teaching and learning.

Human agency and 'being creative' – after Heidegger

Early twentieth century publication of *Being and Time* (Heidegger, 1962) provides an academically challenging analysis of life and the human condition in relation to existence or what Heidegger calls 'Dasein' by probing the question of what constitutes 'being'. For this investigation into the pedagogical nature of creativity, what is important is

Heidegger's discussion of life or being as embodied in everyday practices that create a 'space' or 'clearing' within which ideas, processes and entities such as creativity exist, and events like designing, teaching and learning can take place. In simplistic terms, Heidegger focuses attention onto human agency that is not so much concerned with the extraordinary but with everyday phenomena of lived experience and the perceived realities of life. Hence the analogy between the prerequisites of genius, or exceptional talent in so-called 'big C' professionally validated creativity, become less relevant than piecing together a workable understanding of how routine or everyday 'small c' creativity may be exercised at home, in the studio, in the classroom or workplace. One of the most valuable insights to be gleaned from Heidegger involves attending to the notion of 'caring' as an important component of living and learning.

Heidegger suggests that people constitute their own individual and group identities. At face value this idea seems both obvious and eminently compatible with the professional and vocational aspirations of designers, teachers and learners. However, asserting individual or even group identity in a traditional educational context is often discouraged, especially when it involves individuals or groups of learners deviating from or overtly challenging the views, preferences and priorities of the teacher. Where learners take the initiative to 'do things differently' in terms of design content or creative methodology some teachers may feel threatened. This raises fundamental questions about educational dominance, control and the exercise of relative positions of power within a learning environment. Uncertain, unequal or unfair power relations in the classroom can mitigate against individual creative engagement. Concern arises over the authoritative role of the teacher as director, instructor and leader in a conventional classroom. Instead teachers who seek to encourage collaborative creative approaches in a design studio tend toward a more egalitarian and democratically negotiated function as a facilitator, guide, coach or mentor of other people's learning processes. The 'risks' for both teachers and learners associated with the relinquishing power in the learning situation are addressed in the following chapter in relation to the findings of Schon.

As a function of Dasein, Heidegger describes three aspects of 'being'. Firstly he acknowledges the emotional and attitudinal 'facticity' of the life situation into which each

of us is 'thrown' by circumstances and over which we have no substantial control. Secondly, Heidegger notes the focusing or 'projecting' of our attention and energies onto shaping future possibilities, as an area of potentiality over which we do have some influence. Thirdly he highlights participation in an ongoing engagement, articulation or dialogue with present situations, events and activities through 'discourse'. This third observation accords with Schutz's notion of a 'common language'. It also concurs with what Brockbank and McGill (1998, p1) describe as, '…reflective dialogue and facilitation (placed) in a praxis that takes the 'purity' of how practitioners, teachers, learners and other actors … can engage in facilitating reflective dialogue, and relate it to group learning, supervision and mentoring'. This is not to suggest that language, spoken dialogue or written discourse alone constitutes meaningful learning and life, let alone creativity. Rather it implies a holistic physical, intellectual and communicative participation in whatever it is that people are doing, whether it is designing, or teaching, or learning, or some other endeavour. Here it is important to emphasise that such language and dialogue includes environmental, visual, aural, bodily and interpersonal communication and actions as much as more formal verbal or written discourses that might be otherwise presumed to typify educational practice.

Design is a practical discipline. Designing is about creating and making things new. Central to Heidegger's discussion of 'being-in-the-world', inclusive of practical dealings with the world, is the holistic notion of 'functionality' in relation to knowledge, skill, action and purpose. These are key issues in teaching for creativity in design education and noteworthy in relation to all forms of education. Of particular interest to this study are two interrelated philosophic concepts put forward by Heidegger that are relevant to studio based design education. In an attempt to explain the relationship between thinking and doing in practical contexts like using tools, Heidegger describes two mind/body states that he calls 'present to hand' and 'ready to hand'. At first the distinction between the two ideas may seem purely semantic.

However, this distinction warrants closer attention by anyone charged with the responsibility of teaching students how to perform complex and intellectually demanding practical tasks creatively. Successful design teaching and learning involves engendering

sufficient understanding and confident manual and intellectual dexterity in the individual practitioner to allow scope for creative ideation, analysis, judgement and problem solving on concrete tasks. Designing a brochure, chair or building involves an open-ended process that must address many routine, as well as non-routine, contexts presented by the real life situations in which the outcome of the designer's work will be put into use by others.

By way of example, Heidegger considers what might be involved in a person learning to make a bookcase. Specifically he analyses what might be involved in mastering the relatively simple act of using a hammer as a tool. Heidegger looks, not at the technical process of how to construct a bookcase, but rather he focuses on what happens when a person picks up a tool such as the hammer (or a pencil or computer mouse for that matter) to do the job. The tool assumes importance as the 'means to an end' and the creative success or quality of the resultant bookcase may be seen in part as a function of how well the hammer (or other tool) is used in realising the design ideas. This corresponds with Aristotle's notion of '*eupraxia*' or a striving for excellence in practice.

Hence the hammer enters into what Heidegger calls 'a web of significant relations' shaped by the design project of making a bookcase. The inanimate hammer becomes an indispensable part of the skilful and intentional human activity. However, there is an essential and holistic learning process involved whereby the novice who picks up the inanimate hammer (or the designer's pencil or computer mouse) at first cannot help but handle it clumsily. In this case, the hammer (pencil or mouse) is considered only 'present to hand' while ever it remains an awkward appendage diverting attention and creative concentration away from the job to be done.

The tasks of designing or making cannot get done until the learner moves beyond the self-conscious preoccupation with the tool to focus on the problem to be solved or the creative job to be done. Attention must shift to the interpretive and decision making aspects of the design realisation process. In a teaching context this attitudinal, physiological and intellectual transition from novice to increasing levels of expertise is what the design educator must be able to manage, always leaving room for differences in individual creative awareness, confidence and capability to grow, often at differential rates amongst

individual learners. Theoretical or procedural knowledge of the steps involved in building a standard bookcase will do nothing to redress the ineptitude of the novice in using the hammer (pencil or mouse). Similarly, demonstration and unrelated practice in proper hammer use is also of limited relevance to the learner, as is written or diagrammatic explanations or a lecture about the use of different sorts of hammers under various hypothetical conditions.

Coming to terms with the needs of the learner, in conjunction with the needs of end-users involving the purpose behind the project, requires another whole order of educational and practical design development. For instance this might be a bookcase for one's own room, the 'story corner' for a kindergarten, the reference section for a public library or in fact a mobile library to be housed in a vehicle of some sort. Equally it could be the display shelving for a retail bookshop or a conservation strategy for archival storage of precious books or government records. The bookcase could be made of a whole variety of materials, wood construction that requires a hammer being only one.

What needs to take place initially is a process of individual familiarisation between the learner and the physical and conceptual tools they are attempting to employ as a novice designer. At the practical level this may include the hammer, pencil, computer mouse or stencil knife, as well as the electric drill press, drafting machine, computer graphics program or digital camera for example. It also extends to understanding and manipulating the relationship between two-dimensional images and three-dimensional forms and spaces in a wide range of materials and contexts, depending on the design discipline and the application. Heidegger's point is not predicated on the hammer per se. Rather he is acknowledging that with guidance, familiarisation, application and practise the learner ceases to focus on the alien object or idea they are wielding and shifts their creative attention to holistically performing the desired intellectual, organisational, visual and more broadly practical tasks. If the overall work is performed well the learner will have succeeded in achieving *'eupraxia'*, from which he or she can justifiably draw personal satisfaction and motivation to continue engaging in the learning process.

The word 'perform' is critical here because it implies an experiential integration of mental and physical effort that can be creatively oriented. At this point the theoretical or

propositional knowledge becomes relevant and the hammer, pencil or computer mouse becomes an almost automatic extension of the learner's body, eye and mind. In some strange way the tool becomes part of the designer's 'being', described by Heidegger as 'ready to hand'. This is where implement, skill, body, technique, action, purpose, intention, function, as well as design concept, material understanding and construction technique, client or market knowledge all begin to meld into embodied and enacted expertise, focused on a creative outcome in a specified design context. This is the coherent creative state of being that Csikszentmihalyi (1996) characterises as 'flow'.

Where choices come into play about the placement, proportion, shape, form, materials and finish of the bookcase, that are unique to the individual learner or situation or introduce new and innovative possibilities or resolve a larger problem, then creativity can been seen to assert itself within the overall activity. At this point Aristotelian *'phronesis'* or practical wisdom becomes apparent. In most cases this will constitute 'small c' creativity tending more toward relative particularity and 'newness to the person', rather than true uniqueness or originality of design. In other cases, the designer's effort may generate 'large C' creativity where the outcome is judged favourably by field experts and acknowledged as a genuinely creative contribution to the domain. This involves 'social validation' (Ripple, 1999), such as the development of an entirely new modular or demountable system for storing books, documents or other items, created in response to a design brief, especially if the design achieves wide acclaim or commercial popularity.

At this point choices can be made about how best to use the hammer or in fact which hammer is best to use, or whether another tool entirely is more appropriate to the creative task or the materials selected for the designer's plan. This holistic understanding of the creative process also allows room for individuals to move from frustration to confidence and enthusiasm. This is where the scope for activity, creativity and indeed expertise, or what Schon calls 'artistry' begins to broaden out. With increasing confidence the learner feels free to engage in what Aristotle calls *'phantasia'*, imagining and planning what improvements or other projects might be tackled once the standard or indeed innovative solution to the bookcase is completed to one's own and/or the client's satisfaction.

In this scenario, the learner is not a passive recipient of atomistic or instrumental learning, but an active protagonist in the holistic educative process where creativity has room to grow. Neither is this a description of a singularly cognitive nor manual process. When engaging in 'practice' learners experience Dasein by being 'thrown' into a situation not of their own making. They then move into a future oriented position that enables them to engage physically, intellectually and creatively in a discourse between themselves, others, tools, materials, techniques and goals in relation to an authentic integrated life experience. This experience encapsulates the emotional, ethical and social dimensions of true *'praxis'*.

The role of the design teacher in such a scenario is not to teach woodworking skills, though this may be a necessary step in the process of creation. Rather the teacher is there to facilitate the holistic life processes that encompass creativity in an iterative way. Ideally the teacher should avoid what both Heidegger and Dewey call the 'spectator attitude'. Instead the teacher has the opportunity to immerse themselves bodily and psychologically, as well as intellectually, academically and practically, in the experiential process by engaging creatively, not only with the teaching, but also with the learning activity.

The teacher can choose to act as a guide or role model, mentoring his or her students in how one negotiates both familiar and unfamiliar practical, intellectual and creative situations. The teacher can act as a coach or facilitator assisting the learner to navigate through all the unfamiliar knowledges, skills, attitudes, emotions and embodied actions needed to integrate higher order creative capabilities. Teachers can establish that metaphorical 'space' within which creativity can emerge by identifying strategies that enable learners to explore and develop relevant solutions and move toward independent performance at a professional level. In this sense the teacher is an active participant and committed stakeholder in the learning, rather than an aloof learning director focused on the one-way delivery or transmission of procedural and content information, or just an impartial demonstrator of technique, a setter of problems or a dispassionate assessor. Levin (1999) summarises this aspect of Heidegger's 'discourse on the body':

On my reading … (this) includes… what he has to say about … feeling and mood; the platonic separation of the sensuous and the supersensuous; hearing the call of the conscience; the habitual patterns of listening… into which we fall and the arduous task of learning how to attune our ears in the spirit of hearkening…; the errancy in the phenomenalism (e.g., its failure to understand the difference between hearing a sequence of detached sounds and hearing the sounds as those of a worldly thing); the ego-logical pathologies that dominate our "normal", everyday sight and the difficulties that separate us from the "moment of vision"…; the way we normally, typically, and habitually relate to the lighting that makes vision possible; and finally, the activities of the human hand (including the labour of the hands, their technological skills, and the hand's cultural significance in writing, gesturing, and calligraphy), the role of the hands in reducing the presencing of being to an ontology limited to being-ready-to-hand and being-present-to-hand, and the difference between the human hand and the paws, claws, and talons of other animal species… (Levin 1999, p. 125)

Apprehending the sensate in embodied creativity – after Merleau-Ponty

Creativity in design involves heightened imaginative, visual and psycho-motor sensitivities (McKim, 1980). These attributes constitute an indispensable aspect of professional expertise in design practice. Therefore pedagogical strategies that serve to heighten conceptual, visualisation and representational abilities are core concerns in design education. However Goldschmidt (1999, p. 525) readily concedes that, 'Creative design is held in great esteem, but we still know little about design cognition and the cognitive abilities and strategies that contribute to creative design thinking'.

Goldschmidt tracks various theoretical investigations into design process and design methods, including the 'iterative sequence of analysis, synthesis and evaluation', involved in the transformation of abstract ideas into concrete design outcomes. In the process she acknowledges significant psychological and cognitive research difficulties associated with 'visual thinking' and designers' characteristic reliance on non-verbal similes, metaphors and analogies enacted in practical strategies for mental imaging and concept sketching. Deferring to Schon, in terms of 'the feedback loop that is created during sketching, as single sketches or entire series of sketches "talk back" to the designer who creates them', Goldschmidt (1999) infers that there is more to creative designing than critical analysis of input information, deductive reasoning or procedural design methods and production processes:

Most researchers agree that sketching is more than a memory aid whose purpose is to record externally images that are generated internally. Rather inner representations in imagery and external representation in the form of sketching collaborate in an interactive process that allows entities like design objects, which do not yet exist and have never been perceived, to be conceived and brought gradually to completion through sequences of transformation and refinement… The process of designing has been described by Donald Schon as a dialogue that the designer conducts with his or her

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materials, and it has been argued by other students of the design process that the design sketch "amplifies the mind's eye". (Goldschmidt 1999, p. 535)

Considering what this might mean in relation to embodied creativity in design, the theories of Merleau-Ponty are particularly pertinent to any discussion of design education because his professional concerns encompass education, philosophy and aesthetics. From 1948 to1951 Merleau-Ponty took up the Chair of Child Psychology and Pedagogy at the Sorbonne in Paris, following the departure of Piaget. In 1952, aged just 42 years, he was the youngest appointee to the prestigious Chair of Philosophy at the College de France. Among other associations Merleau-Ponty was a peer and ultimately a critic of Sartre and a teacher of Foucault. He is also said to have provided, '… some of the germs of a postmodern metaphysic' in his discussion of a 'polymorphous Being' (Johnson, 1993, p. 54). Between 1945 and 1960 Merleau-Ponty wrote a series of essays drawing on the art work, interviews and writings of modernist painters like Paul Cezanne, Paul Klee and others. In these essays and other published works Merleau-Ponty expounds his philosophical ideas about embodiment and intentional attitudes involving the nature of aesthetic experience, perception and imagination as a creative mental act within an overtly holistic and corporeal context. In his treatise on the *Phenomenology of Perception* Merleau-Ponty (1945) builds upon the phenomenological theories of Husserl as, '… a new way of describing the meaning of human experience in the world'.

Just before his untimely death in 1961, Merleau-Ponty (1960, pp.121-149) wrote a key essay titled the 'Eye and the Mind' that interrogates many of Heidegger's ideas in *The Origin of the Work of Art* (Heidegger, 1993). 'Eye and Mind' is a seminal work in which Merleau-Ponty is said to assert a 'gestural' theory of art (Sanders, 2000) whereby, 'The painter takes up the brush, … and gesturally enters into a relationship, with the medium of paint, the canvas, and the elements of the world which have been seen and felt… The memory of seeing and touching are not, however, stored in the mind like a representation, that is Merleau-Ponty's main point, rather they are stored as a carnal memory in the body'. In the original text Merleau-Ponty (1960) painstakingly describes fully embodied creative activities, couching his probing discussion of seeing and touching, in highly poetic language. Since the corporeal issues he strives to articulate are somewhat difficult

to comprehend his careful choice of words is worthy of a close and detailed reading to appreciate the relevance of his subjective insights for this discussion of creativity:

> Everything I see is on principle within my reach, at least within the reach of my sight, and is marked upon the map of the 'I can'. Each of the two maps is complete. The visible world and the world of my motor projects are each total parts of the same Being… This extraordinary overlapping, which we never give enough thought to, forbids us to conceive of vision as an operation of thought that would set up before the mind a picture or a representation of the world, a world of immanence and of ideality… The enigma derives from the fact that my body simultaneously sees and is seen. That which looks at all things can also look at itself and recognise, in what it sees, the 'other side' of its power of looking. It sees itself seeing; it touches itself touching; it is visible and sensitive for itself. It is not a self, not by transparency, like thought, which never thinks anything except by assimilating it, constituting it, transforming it into thought - but a self by confusion, narcissism, inherence of the see-er in the seen, the toucher in the touched, the feeler in the felt – a self, then, that is caught up in things, that has a front and a back, a past and a future… (Merleau-Ponty 1960, p. 124)

Here Merleau-Ponty focuses on the holistic and fundamentally inseparable functioning of mind with body that many art and design educators tacitly recognise as the subjective, intersubjective and reciprocal pivot around which their teaching efforts must turn if creativity is to be stimulated in their students. It brings to the fore a heightened awareness of self during the experience of being creative. Inculcating an appreciation of self-awareness as an aspect of personal performance is inherent in the best design teaching and learning, because it empowers students with a sense of their individual creative potential and resourcefulness. Before teaching a student to 'draw' creatively for example the teacher must first encourage the student to consciously 'look' and conscientiously 'see' and apprehend things differently from everyday vision. Ultimately the teacher must convince each and every student to visually engage, interpret and assimilate his or her visual awareness of objects. These objects occupy space in the visual field in response to the incidental or manipulated fall of light and shadow, and must be positioned in relation to other objects or referents including themselves as conscious observers. If the student changes position, so the viewpoint and object outline changes accordingly. If the light dims or brightens, so the form and the colour change as an ephemeral function of their personal experience of perception. For the teacher, this involves a process of awakening self-knowledge in students whilst also by necessity continually honing their own perception and self-awareness.

With conscious effort perception is made explicit so that the visual and felt information derived from the experiences of looking, seeing and touching can become accessible as

raw material in the process of actively designing. Every mark on the designer's page is the result of a bodily gesture guided by decisions that are enacted through the pencil or other tool in hand. Merleau-Ponty (1960) explains this dynamic very well:

> The body's animation is not the assemblage or juxtaposition of its parts. Nor is it a question of a mind or spirit coming down from somewhere else into an automation: this would still suppose that the body itself is without an inside and without a 'self'. A human body is present when, between the see-er and the visible, between touching and touched, between one eye and the other, between hand and hand, a kind of crossover occurs – when the spark of the sensing/sensible is lit, when the fire starts to burn … Once this strange system of exchanges is given, we find before us all the problems of painting… (Merleau-Ponty 1960, p. 125)

Merleau-Ponty primarily draws his insights from the realm of painting when he tackles design-related issues as image making through drawing. For those who have not personally struggled with the visual communication processes involved in image making it is useful to again defer to Merleau-Ponty when he equates the 'quasi presence and imminent visibility' of a drawing or design with evidence of the workings of the imagination made tangible and therefore available to teaching and learning:

> The word 'image' is in bad repute because we have thoughtlessly believed that a drawing (or design) was a tracing, a copy, a second thing, and that the mental image was such a drawing (or design), belonging among our private bric-a-brac. But if in fact it is nothing of the kind, then neither the drawing nor the painting belongs to the in-itself any more than the image does. They are the inside of the outside and the outside of the inside, which the duplicity of feeling makes possible and without which we would never understand the quasi presence and imminent visibility which make up the whole problem of the imaginary… (Merleau-Ponty 1960, p. 126)

No doubt such philosophical discussions taken out of context can be extremely demanding, both in terms of the obtuse meaning and the language translation of Merleau-Ponty from French to English, which sees the substitution of design for drawing in different texts. However, for the design teacher the issues of most significance in Merleau-Ponty's 'Eye and Mind' are clear references to the notions of 'I can' and 'lighting the fire' that imply a fertile volitional slippage between 'sensing' and 'sensible' in terms of imagination.

To target creativity in teaching and learning for design education one must certainly acknowledge the corporeal context involved in studio practice. However, a fundamental measure of success is whether or not the learner enters voluntarily into a shared belief structure affirming his or her own individual capacity to be creative, to see, to sense and to imagine. Intuitively, design teachers need to cultivate their capacity to induct students

into an attitudinal realm whereby they come to believe in their own potentiality as designers. This involves activation of the 'I can' principle identified by Merleau-Ponty. It is manifest in notions such as 'I can draw', 'I can design', 'I can solve (visual and other) problems', 'I can generate multiple ideas of creative merit and put them into practice' – 'I am a creative individual'.

In an educational context, the idea of 'lighting the fire' is about teachers actively stoking the embers of ambition and ego to create sparks of passion within each student. This passion is most productively linked to growing each learner's commitment to design as a vocation that inspires and motivates the individual to strive and achieve to the best of their emergent creative, intellectual and technical abilities. Coupled with such aspirations must be a willingness to critically reflect upon and analyse his or her own performance in relation to that of forerunners and peers, to identify ways to hone their own personal design capabilities. From a teaching perspective then, Merleau-Ponty's notion of 'lighting the fire' is not at all about methodically imparting prescribed propositional or applied knowledges, or specialist technical skill sets, though these curriculum considerations are unquestionably essential components of the learning.

Appreciating this distinction is significant because design is not about mediocrity or copying the work of others, no matter how useful or well respected. As such, the goal of design education should certainly not be constrained to emulating minimum competency standards on a preconceived body of operational knowledge and skill. Rather both design and design education are about working within a flexible and negotiated frame of reference and striving for excellence in the envisioning and generation of different, alternate and at times entirely new or unexpected approaches to the task in hand. One of the key ingredients of design excellence is creativity or some element of 'newness' or innovation evidenced in the process or outcome. Achieving creative outcomes on a reliable basis involves intentionally departing from the norm and repeatedly taking calculated risks that are purposefully designed to challenge, test and exceed the status quo.

Unlike painting and other of the fine arts, design is much less concerned with expression and notions of essential uniqueness or originality. Rather design is concerned with fitness

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for purpose and initiating genuine innovation or inventiveness within a given context. Design is generally driven by client expectations with a focus on meeting the needs of end users, coupled with respect for broad community values and aspirations. Nonetheless art and design share many fundamental teaching and learning characteristics that are perhaps most evident when it comes to stimulating creativity in students through visually oriented self awareness, interpretation and experimentation.

Merleau-Ponty is ambitious in discussing painting and drawing in terms of the realisation of visual design content. He explores many abstract considerations including the two-dimensional surface, planes and colour, blank space, line and composition commenting on how creative activities such as design involve a great deal more sensitivity, embodied commitment and psychological application than simply a knowledge of technique. In trying to come to terms with the nature of creativity for design education purposes, it is significant to consider how eloquently Merleau-Ponty refutes the Cartesian separation of mind and body:

> It is Matisse who taught us to see his shapes not in a 'physical-optical' way but rather as structural filaments, as axes of a corporeal system of activity and passivity… Now perhaps we have a better sense of how much is contained in that little word 'see'. Seeing is not a certain mode of thought or presence to self; it is the means for being absent from myself, for being present from within at the fission of Being … The eye accomplishes the prodigious work of opening the soul to what is not soul – the joyous realm of things … A Cartesian can believe that the existing world is not visible, that the only light is in the mind … A painter cannot agree that our openness to the world is illusory or indirect, or that the mind has to do only with its thoughts or another mind. He (she) accepts … what is without place must be subject to a body – or, what is even more: what is without place must be initiated *by* the body … Through vision then the painter touches both extremities … something has moved, caught fire, which engulfs (the) body; everything … is in answer to this incitement … Vision is the meeting, as at the crossroads, of all aspects of Being. (Merleau-Ponty 1960, pp. 144-147)

Finally Merleau-Ponty's notion of 'flesh' (Merleau-Ponty, 1968) refers to the unavoidable reciprocity of lived experience where it is fundamentally impossible to separate abstract matters of the mind from the earthy concerns of the body in any meaningful way. An alignment of creativity with the idea of flesh helps bring creativity into corporeal focus as a fragile and flickering flame of human potentiality. It also underscores the contingent relationship between creativity and the evolution of the human condition evidenced as a thread of meaning making that links one fallible individual with the next across time. In this respect, as noted in the previous chapter, human creativity exists as a long standing cultural baton or meme that is prone to circulate hand to hand

and metamorphose in response to the rise and fall of social priorities and the relentless impetus imposed by change.

In advancing understanding of the importance of embodiment, Lakoff and Johnson (1999 p. 543) pause to reflect momentarily on the role of philosophical metaphor, such as Merleau-Ponty's reference to 'flesh'. They suggest that, 'Metaphors are the very means by which we can understand abstract domains and extend our knowledge into new areas. Metaphor, like any other embodied, imaginative structure, is… a remarkable gift – a tool for understanding things in a way that is tied to our embodied, lived experience … it is the metaphors that unify… (philosophical) theories and give them the explanatory power they have. There is no philosophy without metaphor'. Extrapolating Merleau-Ponty's metaphor of 'flesh' in discussing the 'body in education' O'Loughlin (1997) concludes:

> … we may need to recover some of his key insights in order to enrich our understanding of human subjectivity in ways which avoid some of the pitfalls … and which remind us of the 'lived engagement' of the embodied subjects of education… It seems to me that returning the notion of embodiment to centre stage is crucial to education. Postmodernists and critics alike need to direct our attention to the complex realities of students' and teachers' embodiment… There is, it seems, a creative power in the body to which we fail to do justice when we persist in seeing it as the handmaiden of consciousness, or when we ignore the body's intelligent connections with the world at hand… Merleau-Ponty's account of body-subject and 'flesh' demand that we pay attention to the connectedness of body-subject to world and of the immersion-in-world that is the reality of human existence. (O'Loughlin 1997, pp. 20-27)

Toward a pedagogy of creativity – after Vygostky

The accumulated evidence from cognitive psychology and neuroscience, coupled with the foregoing philosophical argument reinforces the need for an approach to design education that proactively encourages creativity and knowingly facilitates individual growth and holistic life processes in an iterative way. All indications suggest that such a pedagogical approach must be fully embodied in its engagement with the doing of design, giving priority consideration to the crucial role of emotion in cognition and the formation of constructive and enabling attitudes, beliefs and values about the social relevance of enacted creativity. Such ideas about creativity are certainly not new in educational theory. Awareness of the context dependent and embodied nature of creative learning aligns with what Vygotsky recognised as socially constructed and environmentally situated knowledge. Gajdamaschko (1999) summarises Vygotsky's views on creativity thus:

> … he believed that creativity is a higher psychological function. It is one of the complex and multidimensional human characteristics … linked to the free processing of elements of our experience, creating their free combinations. It requires an inner freedom of thinking, activity, and cognition that is possible only for "cultural man"… He characterises creativity as the ability of humans to deal not just with the past or react to the present, but the ability to deal with change and with the future … Vygotsky viewed imagination and creativity as equal parts of all aspects of cultural life, including artistic, scientific, and technical creativity. In this sense, all that is the work of the human hand, the whole world of culture, was distinguished in his view from the natural world because it is a product of human imagination and creativity based on imagination. (Gajdamaschko 1999, p. 695)

For Vygotsky, higher psychological functions are socially based, culturally acquired, 'instrumental' or mediated, actively and voluntarily co-constructed and controlled as part of a functionally integrated and complex learning system. Lindqvist (2003) recalls that Vygotsky began his career early in the twentieth century researching and writing about the psychology of art and went on to develop a fully articulated theory of creativity that, '… started with a realistic approach to imagination, and … ended with a dialectical attitude to imagination'.

In particular, Vygotsky's work pedagogically links emotion with consciousness, and reality and imagination with aesthetics, underscoring the social basis of human learning, life and culture. Vygotsky draws a very clear distinction between memory for 'reproduction' that involves past-oriented knowledge, and creativity for 'production', which he sees as future-oriented and adaptive, highlighting the central role of human creativity in dealing effectively with change for the purposes of survival and prosperity. Explaining Vygotsky's theory of art and creativity as, '… a theory of the social techniques of emotion', Lindqvist (2003) notes the pedagogical import of his analysis:

> Vygotsky discussed the issue of reproduction and creativity, two aspects that relate to the entire scope of human activity. Compared to many other theories on creativity, Vygotsky claimed that all human beings, even small children, are creative and that creativity is the foundation for art as well as for science and technology. This creative ability Vygotsky (1995) called *imagination*. Imagination is the basis of every creative action: 'It manifests itself in all … aspects of our cultural life, making artistic, scientific and technological creativity possible'. (Lindqvist 2003, p. 8-9)

According to Vygotsky's theory of creativity there is a cycle of imagination that is not dissimilar to Damasio's cycle of influence involving existence, consciousness and creativity discussed at the end of the previous chapter. Vygotsky's cycle of creative imagination describes a transformative process whereby people consciously extract selected fragments from their conscious experience of reality, and use their imagination to adapt, develop and translate these fragmentary perceptions into new ideas and

interpretations. The new ideas are enacted and applied so that they re-enter reality in concrete form as new contributions. These new contributions then change the shape and scope of reality to open up new possibilities and in turn become available for creative re-selection at some future time by other people. This goes a long way toward explaining just how creativity is perpetuated as a 'meme' in human affairs beyond the life and times of individuals, communities and cultures. Vygotsky's cycle of imagination in Figure 6:1 below illustrates the iterative and socially based nature of human creativity.

Figure 6:1 Vygotsky's cycle of creative imagination.
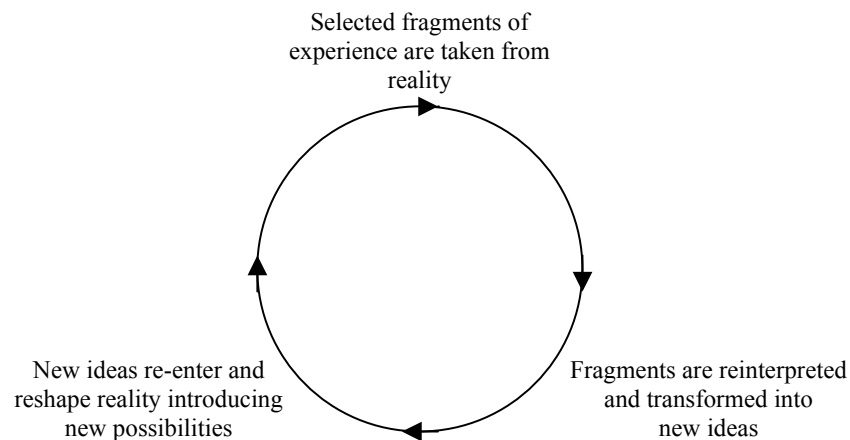
Lindqvist (2003) compares the humanist interpretation of Vygotsky's 'prospective' theory of creativity in education to the 'retrospective' approaches used in traditional educational practices to assert:

> If activity would be limited to reproduce the past, (human beings) would be … creature(s) totally focussed on the past, only capable of adjusting to the future if this was a reproduction of the past. Creative activity is thus what makes (humans) … focused on the future, capable of shaping it and changing his (her) current situation… Creativity is essential to the existence of humanity and society… it is not only a question of artistic creativity, but also something that is necessary for our process of consciousness… Prospective education implies that a student should be capable of approaching problems that do not yet exist at the moment. The student must be oriented toward productive (creative), rather than reproductive, knowledge. (Lindqvist 2003, pp. 9-12)

Building on this premise, Vygotsky also advocates a theory of teacher assisted learning or 'scaffolding', that actively challenges and facilitates the raising of learners from one level of experience to another, where students progressively gain increasing knowledge, confidence and ability. While Vygotsky dealt with play and imagination in child

development, his in-depth analysis of creativity also holds true at a sociological level in adult education. As such, the resurgence of interest in Vygotsky's theory of creativity and its educational implications offers some important pedagogical insights for overtly addressing creativity in relation to design education.

Practical reasoning and embodied dispositions – after Dewey

Vygotsky, like Heidegger and Merleau-Ponty, were European contemporaries of Dewey who studied neo-Hegelian philosophy and experimental psychology in America at Johns Hopkins University from 1882. Well before the late twentieth century rise of postmodern scepticism, Dewey advocated a pragmatic view of truth or rather 'warranted assertibility' as a contingent process of individually constructed knowledge based on prior experience. First at the University of Chicago from 1894, and later at Columbia University till 1930, Dewey sought to actively draw together insights from the study of philosophy, psychology and pedagogy. By 1905 Dewey had already served as president of both the American Philosophical Association and the American Psychological Association. Through his active commitment to educational experimentation at the Laboratory School in Chicago, Dewey demonstrates an educative valuing of the emotional, creative and generative impulses. By cultivating the affective sensitivities and achievements in the visual and other creative arts, Dewey shows how it is possible to address the more cognitive pursuits in an engaged and generative manner whilst teaching people how to lead potentially more holistic, fulfilling and experientially rich lives.

At the height of his career, Dewey argues for active engagement with the creative arts not just in education but throughout life. He asserts that the aesthetic pursuits involved in the creative acts of doing and making provide a vital means of awakening the intellect and cultivating the senses as a way of enriching enjoyment and enhancing the fully embodied experience of life. In some respects this approach concurs with what has since been called 'lifelong learning'. Through an engagement with art and design Dewey (1934) asserts that people develop heightened self-esteem and learn to appreciate the worth of others. This represents Dewey's overarching educational vision for achieving a peaceful, prosperous and tolerant democratic society. Dewey's theory of practical reasoning underpins his

philosophy of education and informs his view of the role of the teacher. Examining Dewey's stance on practical reason in some detail Garrison (1999) concludes:

> For John Dewey, the pattern of practical reasoning is central to all inquiry… all meanings are consequences of socially shared action, and all objects, all truths, including the formal laws of logic themselves, are the fallible and contingent objectives of inquiry… The philosophical fallacy involves failing to understand that we cannot have the cognitive products without the artistic process… 'Activity', Dewey avers, 'does not cease in order to give way to reflection'. Inquiry, reasoning, feelings, imagining, and creating are all moments and continuations in action. (Garrison 1999, pp. 291-293)

Garrison's analysis of Dewey's views on practical reasoning potentially unsettle certain prevailing assumptions about the creative relevance of Problem Based Learning as discussed in a previous chapter. At issue is the notion that creative outcomes or ends are not necessarily compatible with the setting of predetermined problems by teachers, especially where the solutions are too narrowly framed leaving little scope for learners to exercise practical reason as 'intelligent, though situated, freedom'. Garrison claims that for Dewey teaching and learning:

> … is a matter of co-ordinating a situation; it is not simple, linear problem solving… (it) involves the inquirer modifying himself (herself), including … motives and ends, as well as the environment. Practical reason for Dewey, involves critical reflection and careful deliberation upon the ends of action; thereby creating the conditions for intelligent, although situated, freedom. His theory of practical rationality is holistic; what are means and what is the end emerge in the process of coordination, and are not apparent until the completion of the inquiry. The results of prior reasoning may motivate future action as well as alter the ends; reasons may serve as causes of action. The source of freedom for Dewey lies in the creative use of productive practical reason. (Garrison 1999, p. 301)

Noting the importance of goals or desires in relation to the 'I' in Dewey's schema of practical reason – referring as it does to, '… a living person processing, and processed by, her embodied habits of conduct' – a theoretical parallel becomes apparent with the Merleau-Ponty principle of 'I can'. Interestingly, the sequence of Dewey's argument once again turns on questions of emotion, embodiment and values, in this case in relation to teacher education, at which point Garrison invites educators to:

> Recall that for Dewey habits are embodied dispositions to act evincing emotion. He rejected any dualism between the mind and body… thought blends with feelings within the body, or more exactly, within the context of action… to motivate the agent to act… In teacher education … the most important tool, the most momentous means, in any context of practice is the practical wisdom and (holistic) knowledge of the practitioner… Values, or what Dewey preferred to call 'ends-in-view' are ideals that serve to guide conduct… Judging values for Dewey was not just a matter of evaluating the probative force of evidence; instead it involved active experimentation that required creatively constructing value. (Garrison 1999, p. 303)

As noted at the beginning of this chapter, there is an irrefutable weight of scientific, philosophical and educational evidence now available to substantiate the proposition that creativity is a fully embodied higher order human capability. In detail the confluence of evidence confirms not only how but also why creativity is so heavily reliant upon the holistic educational integration of heart, head and hands in teaching and learning processes that are generative and mutually participatory. The critical factors determining the successful educational stimulation of creativity do not depend primarily on the structured and rational transmission of content knowledge or on the practical acquisition of technical competencies in isolation. Success in engendering creativity relies instead on the overt establishment of a situated and sensate educational environment that models and values creative beliefs and attitudes, encourages conceptual exploration and freedom, actively promotes fully embodied subjective awareness and self-determination and facilitates collaborative creative endeavour in life, learning and teaching. For design education to encapsulate creativity these affective criteria are indispensable.

The substantive body of theory cited in this and previous chapters suggests that a creatively oriented pedagogical approach requires a liberal educational atmosphere within which teachers and learners share a certain trust and respect for the creative potential of others. Creativity seems to be more likely to flourish where there is a willingness to relinquish a degree of control over certainty. There needs to be a desire to explore new or unfamiliar knowledge constructs and produce a range of different but broadly relevant outcomes rather than always looking for 'correct' solutions to set problems as the measure of educational achievement. Participants need to feel relatively free to engage physically, emotionally and intellectually with creative learning situations that provide them with experiences that are personally and culturally meaningful. Teachers seeking to promote creativity should consider voluntarily adopting the role of a facilitator and conceding increasing initiative to learners in influencing the day-to-day pedagogic exchange. The focus of design learning needs to be oriented toward enhancing future potentiality by progressively stepping-up student confidence and commitment to becoming actively and intentionally creative. In this respect teachers would do well to see their role as participatory and collaborative, avoiding the tendency to stand aloof and be negatively judgmental during the learning process. Instead teachers need to be willing to

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immerse themselves creatively, mentally and physically in the student learning activities and engage with the wider learning community in order to model what it means to 'be' actively creative as a teacher, as a learner and as a practitioner.

Assessment of student work naturally calls for a more critical evaluation of student outcomes. This requirement is not necessarily incompatible with a collaborative approach, as may be seen in the conduct of the design critique for example. The design critique requires students to actively engage with peers, teachers and occasionally external experts in critically reflecting upon project criteria, intention and output. In this context the design teacher continues to facilitate and collaborate with a range of stakeholders in evaluating student work and students learn how to participate in their own evaluation and how to constructively contribute to the evaluation of the creative work of others.

Unfortunately too few teacher education students experience, or are offered, or are professionally prepared to engage in such a collaborative mode of teaching practice. Many experienced educators, more familiar and indeed much more comfortable with conventional teacher-driven educational practices, may find these suggestions for creative teaching and learning too time consuming, naively idealistic or radically disruptive to current programs and practices. However, as Schon (1985) discovered with respect to architectural education, the approach to creativity advocated in this chapter describes much of what traditionally occurs in the best design education, where studio based practice is the norm. Nevertheless, this characterisation of a creative learning scenario still lacks explicit pedagogical tactics for determining exactly 'how' students and teachers can engage operationally with learning tasks in a reliably creative manner. This is the subject of the next chapter that deals with targeting creativity in design education.

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Chapter 7:

<u>TARGETING CREATIVITY IN</u> <u>DESIGN EDUCATION</u>

The preceding analysis of criteria governing design and creativity informs an in-depth exploration of pedagogical issues in this chapter that focuses on how creativity is best targeted in design education. Theories of reflective practice, communities of practice, and surface and deep learning are employed in conjunction with notions of parallel thinking, possibility generation and perplexity to argue the efficacy of the previously introduced Operational Model of Creative Questioning within the context of the 'New Rhetoric' advocated by Buchanan (1995 & 2001).

Specific insights are drawn from the research of Donald Schon whose detailed investigations into studio based educational practices in architectural design are of particular relevance to this discussion of creativity as a higher order capability. The situated social learning theory of Etienne Wenger is also pertinent in discussing the roles, relationships and interactions between practitioners, teachers and students of design in terms of learning, meaning and identity formation. This brings the importance of surface and deep learning to the fore and highlights the need to attend to social and cultural considerations in developing a meaningful pedagogy of creativity in the teaching and learning of design in schools, vocational colleges and higher education institutions.

Theoretical input from many avenues of research, presented in foregoing chapters, establishes a richly eclectic yet increasingly congruent theoretical frame of reference for this educational discussion. The contextual backgrounding confirms the assertion that creativity is not merely a concern of the individual learner or teacher but also a critically important cultural determinant. Creativity underpins the conduct of human affairs empowering people to deal constructively with uncertainty by proactively managing social, technological and environmental challenges. As such human creativity must be understood as fundamentally dynamic and inherently adaptable in responding to change

and the variable conditions within which it is applied. Educationally, creativity is therefore best dealt with, not simply as a finite personal attribute or narrowly defined competency of individual students but rather, in terms of expansive interpersonal and more broadly socio-cultural concerns.

It goes without saying that, for professional design practice in different fields, discipline-specific design knowledge and skills are essential as curriculum content for course delivery within overall design education. However, design content or design processes or design methods are not the primary concern of this investigation into creativity. Looking beyond specific curriculum content the goal in this chapter is to identify and present a flexible and pedagogically sound orientation to design teaching that encourages and reliably engenders overt creativity in the classroom, studio or workplace. The purpose is to articulate a pedagogical strategy that works at both personal and collective levels for design teachers and learners seeking to be creative in their educational endeavours. An explicit approach to creative learning is significant, not only in planning and delivering design programs to students but also, in developing better informed teacher education programs for beginning teachers of design and technology in schools, colleges and universities.

Intentionally educating for creative capability requires overt pedagogical strategies for nurturing, facilitating and promoting creativity as a shared educational outcome of both teaching and learning in design. The Operational Model of Creative Questioning examined later in this chapter in Figure: 7.1 (also shown earlier in Figure: 2.2) is heuristically useful for encouraging creative engagement in design education. It demonstrates how open-ended rhetorical questioning can be used to initiate creatively oriented learning in students. Two open, future oriented *'What if?'* and *'Why not?'* questions are employed rhetorically to stimulate perplexity, and to intentionally arouse curiosity and promote creative imagination, as a means of triggering a commitment to qualitatively deep interpretive and reflective learning. This accords with what Beckett (1996, pp. 135-149) calls 'hot action' once again recalling Aristotle's notion of *'phronesis'* or practical wisdom. It is also consistent with the studio based teaching model typical of design education that led Schon (1983, 1985 & 1987) to develop his theory of

reflective practice. Likewise, it is compatible with the outcomes of situated learning identified by Lave and Wenger (1991) and later expanded by Wenger (1998) into his theory of Communities of Practice.

As a theme, creativity is implicated in any discussion of invention, discovery and the search for new meaning and different knowledge applications. This involves questioning current understanding, which is standard practice in education wherever the goal is to generate new insights. *'What if?'* and *'Why not?'* questions qualify as two of the 'central modalities' of modal logic, that is 'rhetoric' or the modality of possibility, and 'dialectic' as the modality of impossibility. Contemplating possibility and impossibility in relation to design education Buchanan (2005) concurs:

> These modalities are the source, respectively rhetoric and dialectic – the two intellectual acts centrally concerned with creativity. It is precisely their recognition and use in design that characterises whatever constitutes "new design thinking" at the end of the twentieth century and the beginning of the twenty first century. They stand in sharp contrast to the modalities of much design theory and design education in the twentieth century: modalities of contingency and necessity which… form the basis of traditional technical design education. (Buchanan 2005, p. 3)

'What if?' and *'Why not?'* are dispositional questions that stimulate rhetorical conversations, or personal and interpersonal dialogue, on all manner of contentious issues pertaining to creative design activities. This constitutes a form of 'dialogic reasoning' as incipient narrative, telling the story of design(ing), which has been recognised by many commentators, such as Habermas (White, 1995) and Lyotard (1979), as a 'critical' component of theoretical and pragmatic understanding, which informs argument and action in any field. Discussing ways of 're-imaging reason' in terms of what he calls 'argumentative imagination', Myerson (1994) sees in 'dialogic theories the outlines of an emotional and imaginative contest…'. Qualifying the presumed dominance of deductive logic in theory and practice, evident in design and education as elsewhere, Myerson acknowledges:

> … the pressure of other meanings on argument through experience: a trouble, a risk… accommodating these challenges from emotion and experience… suggesting… a need to enhance the imaginative potential of theory so as to take in all the human aspects of disagreeing and disputing which feature under argument… I suggest that whatever the power of these approaches, we are going to need voices which assert their imaginative potential, and fulfil it, voices which connect theory with experience, including experience as we imagine it to be. (Myerson 1994, pp.146-147)

Before expanding upon the Operational Model of Creative Questioning, it is necessary to reiterate the underpinning assumptions that implicitly and explicitly shape the proposed strategy. These assumptions include the conviction that engendering creativity in design education is not so much concerned with the acquisition of contextually specific design knowledge and technical skills, as it is about harnessing and cultivating 'productive' attitudes toward what it means to 'be creative'. Implementation of this model as a heuristic device in design education requires that experiential awareness of 'felt creativity' needs to come to the fore so that it can be proactively and consciously implemented and enacted in 'doing', 'teaching' and 'learning' design. The strategy of creative questioning is not offered as a definitive theory of creativity. Neither should it be viewed as a didactic instrument that is causally suggestive of a linear series of steps in a set procedure. Rather the Operational Model of Creative Questioning promotes a cluster of implied rhetorical possibilities organised in no special order or priority. As such it exemplifies how creative attitudes can be overtly stimulated, in an iterative manner, as an ongoing means for teachers and learners to engage holistically in design education and design practice throughout life.

For such a strategy to be effective in reliably encouraging creativity, both teachers and learners of design must knowingly cultivate and openly share creative attitudes while collectively aspiring toward a deep approach to participatory learning. In this way creative capability can grow and develop constructively in a pedagogical environment that explicitly acknowledges and addresses the experiential complexity and situated specificity of creative activities characteristic of each specialist field within the broad domain of professional design practice. Understanding this contextual complexity, along with tolerance of the inherent variability and ambiguity, relies on appreciating creativity as a multi-factorial higher order human capability. This appreciation is predicated upon acceptance of a number of principles including the:

- Capacity for creativity in every human being
- Embodied integration of knowledge and skills with attitudes as products of whole-of-person mind and body functioning
- Conscious and sensate nature of enacted creativity as holistic 'felt experience'

- Emotional basis of all lived experience including design teaching, learning and practice

- Central importance of values and beliefs in making meaning in the world through design

- Role of imagination in focusing attention onto productive future-oriented outcomes

- Social nature of design learning and practice as fundamental and ongoing aspects of life

- Contingent nature of knowledge and skill operating within internal and external contexts that are not fixed but rather exist in a constant and inevitable state of flux

- Power of rhetorical questioning in conceptual dialogue and practical debate to agitate knowledge and experience and expand meaning and interpretation

- Variable and adaptive demands of change, which are fundamental to human evolution

- Community basis for formally acknowledging and rewarding creativity in design and education as elsewhere

- Function of human creativity as a cultural 'meme' impacting across time, place, people, professions and cultures.

Schon's (1983, 1985 & 1987) composite theory for educating the reflective practitioner and Wenger's (1998) theory of communities of practice assist in verifying the pedagogical relevance of the Operational Model of Creative Questioning. These two theories are dealt with in turn, acknowledging the criticism of various commentators. This leads into discussion of what constitutes 'mindful learning' and possibility generation in relation to 'surface and deep learning' and the value of 'perplexity' later in the chapter. Perhaps more than any other educational theorist Schon (1985, pp. 1-29) focuses penetrating academic attention onto a detailed explanation of what he considers actually happens in studio based design education. Schon's research is of particular significance in having been commissioned, from within a prominent community of design practice, by the Royal Institute of British Architects (RIBA) Building Industry Trust representing:

> … a contribution to the 'great education debate' of the 1980s, a debate concerned both with general education and that of architects in particular… Architecture and design teaching methods are being

seen increasingly as models for avoiding the polarisation of the arts and sciences in traditional secondary education; an 'education to some purpose' involving both intellectual and practical ability. Such an education produces young people with a much greater all round capability, of great value to them and society … It is hoped that Dr. Schon's work will also aid 'The Education for Capability' campaign of the Royal Society of Arts. (Schon 1985, Preface by K. Ingham, Chairman of RIBA Building Industry Trust)

Notwithstanding the criticism of Usher, Bryant and Johnston (1997, pp. 142-170) of Schon's research methodology in *The Reflective Practitioner* and *Educating the Reflective Practitioner* being textually 'unreflexive' and therefore internally inconsistent, Schon's raw observations and interpretive extrapolations of studio practice remain pertinent to this discussion of creativity in design education. Presented '… as a prototypical design activity', Schon offers an extraordinarily rich source of qualitative research data. In-depth conversational analyses are couched in terms of informal dialogue and educative facilitation. This constitutes invaluable insight into the reciprocal nature of creative exchanges that take place between the teacher and learner of design in a studio context. The educational exchanges captured by Schon resonate with authenticity and creative relevance for the design educator. They provide an opportunity for considered reflection and analysis that is rarely possible when personally engaged in the 'hot action' of classroom discussion about design work in progress.

In *The Design Studio: An Exploration of its Traditions and Potentials* Schon (1985) uses observational case studies, undertaken in the architectural design studio, to deftly track the growth of negotiated pedagogic relationships between the teacher and learners of design. He interrogates the process of 'learning by doing' to identify what he initially calls 'knowledge-in-action' and later describes in some considerable detail as 'reflection-in-action'. While positioning his investigation in the context of pedagogical traditions prevailing in 'modern research university' education, Schon freely admits that situated design studio practice represents a 'deviant… throwback to an earlier mode of education and an earlier epistemology of practice'. He argues that '… some instructors have learned to become not only master practitioners but master coaches… to respond to the imperative … to make design assumptions, strategies and values explicit'. In this sense Schon asserts that '… the architectural studio is an exemplar of education for artistry and problem setting … from which other professions can learn'.

Though Schon does not make a distinction between creativity and design processes, he does analyse the reciprocal visual communication and verbal dialogue occurring in the studio from the different perspectives of the student and the teacher, typifying an interactive two-way educative process. In particular he highlights the primarily experiential nature of intuitive 'know-how' that he sees as inherent within the 'paradox and predicament of learning to design' in a creative rather than instrumental frame of reference where:

> … knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. .. our knowing is *in* our action… Once we put the mode of technical rationality, which leads us to think of intelligent practice as an *application* of knowledge to instrumental decisions, there is nothing *strange* about the idea that a kind of knowing is inherent in intelligent action. Commonsense admits the category of know-how, and it does not stretch commonsense very much to say that the know-how is *in* the action… There is nothing in commonsense to make us say that know-how consists in rules or plans which we entertain in mind prior to action. (Schon 1985, p. 21)

Creative and adaptive practical knowledge, as distinct from theoretical or rule-bound propositional knowledge, may therefore be said to derive from and reside within action or what Schon (1985, p.44) acknowledges as the 'experienced felt-path'. Schon draws attention to precisely the same sort of phenomena that Heidegger and Merleau-Ponty both labour to describe when he makes the point that '… spontaneous, tacit processes of intelligence in action include acts of recognition and judgement, and the exercise of ordinary physical skills… To become skilful in the use of a tool is to learn to appreciate, as it were, directly the qualities of materials that we apprehend *through* the tacit sensations of the tool in our hand'.

This said, where does creativity come into play? According to Schon it emerges in the discussion of 'artistry' and what he variously terms 'intermediate zones of practice' or a 'reflective conversation with the situation'. Schon first establishes a 'schema' where he describes the sort of 'knowing-in-action' characterising skilful practitioners spontaneously exercising 'strategies of action, understanding of phenomena, ways of framing the problematic situations encountered in day-to-day experience… without conscious deliberation'. This he interprets as a '… dynamic know*ing* process, rather than a static body of know*ledge*', a trial-and-error process of 'continual adjustment', refinement and problem solving within both routine and non-routine working contexts to yield intuitively anticipated results. This ability to project oneself into a prospective

learning situation is particularly useful in an incessantly changing world where traditional knowledge, skills and values mutate rapidly and very few working and learning contexts remain uniformly routine or predictably familiar even in the short term.

Following Schon's interpretation, creativity becomes evident where 'surprises' or unanticipated inputs or unique consequences impinge on routinised activity. This potentially disrupts the complacency of 'mindless' performance and upsets established habits. Instead the surprises invite a different sort of response from the creative practitioner. Negotiating the new and reconciling the unexpected in any situation introduces a myriad of potential risks for the teacher and learner of design. In Schon's terms these risks stem from ambiguity, 'uncertainty, uniqueness, value-conflict' in areas of creative practice where prior levels of competence are challenged as somehow inadequate and re-engagement is needed to reassess perceptions and reframe the activity. Schon suggests that such experiences turn back on themselves to demand a degree of reflection that '… must be at least in some degree conscious. It converts tacit knowing-in-action to explicit knowledge of action'.

In educational contexts this calls forth what Langer (2000) describes as 'mindful learning', which also implies 'mindful teaching' based on '… a flexible state of mind in which we are actively engaged in the present, noticing new things and sensitive to context'. She observes '… most of us mistakenly seek certainty' because past experience of formal educational assessment teaches students to value correct answers and avoid the potential risks of engaging with uncertainty. Langer argues that there is identifiable power in conscientiously adopting a 'mindful' pedagogic approach that respects diversity. Leveraging more than a quarter century of experimental research Langer confidently asserts that, 'Mindfulness results in an increase in competence; a decrease in accidents; an increase in memory, creativity, and positive affects; a decrease in stress; and an increase in health and longevity, to name a few benefits'.

The mindful exercise of creativity serves to critically question and challenge prior pedagogical assumptions underpinning action and performance in order to intentionally restructure learning strategies and reshape perceptions, interpretations and problem definitions against revised performance criteria. This sort of educational approach

prompts exploration and experimentation, and encourages the review and testing of new possibilities in search of one or more workable resolutions to the particular task in hand. Schon explains this process in terms of '… the inquirer moving in a situation and the situation "talking back", triggering a reframing of the problem, a re-understanding of what is going on'. He calls this a 'reflective conversation with the situation'. Emphasising that '… reflection begins with attention to feeling', Schon also declares:

> … the notion of reflection-in-action goes a long way towards describing what we mean when we speak of a practitioner's artistry… a capacity to combine reflection and action, on-the-spot, often under stress – to examine understandings and appreciations… in the midst of performance. It is artistry… that enables some individuals to be competent in situations that do not fit the preconceived categories of technique, theory or rule of thumb, that make up the corpus of "professional knowledge". (Schon 1985, p. 27)

Designers actively seek out those 'intermediate zones of practice' where creativity may be overtly exercised in grappling with the conceptual challenges, dynamic ambiguities, complex uncertainties and fascinating potentialities associated with developing innovative ways of making things new. This is the job-of-work that designers do when they accept a client brief for a project. The core professional ability of the creative designer is to make astute judgements between a range of potentially relevant creative options.

How the Operational Model of Creative Questioning works in practice

A simple way to kick-start the design process, and proactively begin to 'do' design creatively, is to approach every design task with an open mind asking two covalent and iterative questions, namely '*What if?*' and '*Why not?*'. The Operational Model of Creative Questioning (Figure 7.1) makes such a creative conversation with self and others explicit as a pedagogical strategy that employs rhetorical dialogue for design teaching purposes. As noted from the outset of this investigation into creativity, the model makes explicit a reflective process of interpretive analysis, reconfiguration and synthesis of information and argument that is commensurate with a higher order capability. The implicit double loop notions of enquiry underpinning this model are self-evident to most accomplished designers.

Experienced designers are familiar with associative and deliberative ways of querying conceptual, physical and contextual information. Designers look for new or unusual

insights to help generate interesting, useful and desirable symbols and images, physical materials or things, dynamic actions or processes, as well as spatial or conceptual environments and systems. These tangible and intangible design applications are what Buchanan (2001, pp. 201-203) describes as the 'four orders of design' aligned with McKeon's four fields of the New Rhetoric (McKeon 1987). Arguing the rhetorical relevance of design as a persuasive mode of visual, non-verbal, verbal and technological communication, with particular relevance to cultural philosophy in the twenty first century, Buchanan asserts that:

> … when attention shifts (from things or products) to action, the designer is also concerned with the design processes, services and other structured activities, whether these activities are for practical action, art and entertainment or education. The central issues in this area of design are temporal sequence and dynamic connection, which bear a close relationship to… the problem of deliberation, where the human being must consider the intelligible consequences or results of action. It is no surprise that this area has emphasised "strategic planning", "information design", "human-centred design", "participatory design", and "evaluation" as central concepts. They are all expressions of a new concern for experience and action in design thinking, where the human ability to make meaningful connections among all of the features of cultural life is the central resource. (Buchanan 2001, p. 202)

Iterative questioning is a form of debate that should also be familiar to all design educators as a ready means of 'looking differently' at every design opportunity. The rhetorical approach, postulated in this model, represents widespread mostly tacit acceptance of a shared body of informal theory that accords with the collective experience of 'doing design'. The generic nature of the model is useful in so far as it demonstrates how creativity is made teachable using a mindful, often implicit, action-based approach to design practice and design education.

The Operational Model of Creative Questioning, featured in the following Figure 7.1, describes one reflective mechanism among many by which design practitioners, design teachers and design students in any field can knowingly initiate open ended deliberative questioning of the requirements and potentialities of each new design brief. This dialogic approach can be readily adapted to consideration of the specific concepts and contexts to which the brief relates. For example, this strategy can as readily be used to analyse a building location or the spatial functionality of an interior design retail refurbishment, as it can be applied to determining the purpose and target market for a new consumer or

industrial product, or defining the demographic, season and style of a new fashion collection.

Figure 7.1: Operational Model of Creative Questioning (also shown as Figure 2:2, p. 32).

Embodied Design Attitudes
HOLISTIC HIGHER ORDER CREATIVE CAPABILITIES
Enacted sense knowledge
Speculative questing for Motivation and Meaning
Integration of other design and existential knowledges involving
Discernment, Critical Judgement and Reflection-in-Action within
Multiple social contexts and Communities of Practice for Identity
Learning as Experience, Doing, Belonging and Becoming

What if? **- CREATIVITY -** *Why not?*

You reject certainty
Question the familiar
Pursue potentialities, argue alternatives
Value difference, promote diversity
Visualise new possibilities
Generate multiple ideas (ideation)
Develop fresh concepts, make different
Explore concurrent feasibilities
Challenge the odds, explore probabilities
Multiply, divide, subtract, add options
Make alien, unusual, ugly, unfamiliar
Select review, refine, reject options
Reinvent, reengineer, reevaluate, reflect
Reinvigorate the mundane
Pioneer, seek the unknown & unexpected
Invent, innovate, speculate, ruminate
Defy inevitability, deny impossibility
Reshape destiny
Create

Look
See/Perceive
Feel/Experience/Value
Believe/Question
Visualise/Imagine
Forecast/Envisage the Future
Brainstorm/Mindmap
Make new Meaning
Act/Apply/Adapt
Do/Make/Prototype
Scrutinise/Evaluate/Challenge
Analyse/Judge/Critique
Rework/Remake/Repurpose
Frame/Mount/Present
Discuss/Review/Refine
Produce/Market/Distribute
Use in Context/Check Reality
Double loop
Feedback

Try, take risks, play, discover
Explore, experiment, provoke, tease, unravel
Guess, gamble, read, puzzle, worry, annoy
Speculate, hypothesise, problematise
Trial, test, model, mould, unmake, abuse
Modify, manipulate, mutilate, fracture
Remember, dismember, deconstruct
Falter, fail, find, rethink, reframe, restart
Name, rename, describe, (de)contextualise
Visualise metaphor, satire, irony, pun
Appropriate, metamorphose, evolve, reconfigure
Compare, critique, ridicule, mimic, mock, mime
Narrate, mythologise, lie, trick, deceive
Amuse, delight, dally, disappoint, sadden
Fantasise, dramatise, frustrate, frighten, shock
Clutter, cluster, collect, organise, categorise
Simplify, balance, harmonise, interrupt
Interfere, tip, tumble, toss, eclipse
Restart, make new

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The creative questioning strategy can be used to resolve both simple and complex design tasks. Equally, individual learners, small working groups or large teams of designers collaborating on big projects in industry can employ the principles underpinning the model to fast track innovative design responses when working to deadlines. In design education, the creative strategies inherent within the model help induct learners into the realm of 'possibilities' utilising a creative orientation that is needed to begin doing things differently.

Application of an heuristic approach to designing is creatively liberating. It decentres the status quo and overtly shifts practitioner perceptions away from 'what is'. In opposition to the traditions of Western logic and the pre-eminence of certainty espoused via deductive reasoning, a commitment to creative questioning invokes what de Bono (1994, p. viii) describes as 'parallel thinking'. Here emphasis is placed on 'designing forward from a field of parallel possibilities… Parallel thinking is more concerned with "what can be" than with "what is"…'. This orientation enables individuals or groups to actively probe for new possibilities, whilst conveniently revisiting options and plundering perceived impossibilities. It permits the exploration of different contexts, while encouraging experimentation with multiple, potentially equally valid, alternate concepts. The '*What if?'* and '*Why not?'* scenarios readily tolerate diversion and ambiguity in a conscious effort to generate diversity by constantly provoking and challenging assumptions about design knowledge and content, design elements and principles, design processes, design production and design outcomes. This can be done repeatedly if necessary on behalf of oneself, in conjunction with one's peers, clients or other stakeholders until optimal design directions become apparent.

However, as a means-to-an-end-in-view the Operational Model of Creative Questioning guarantees no certainty of success. As an inherently iterative mode of practice the model requires ongoing thought and action where the practitioner must constantly analyse, synthesise, interpret and select between competing possibilities that are evaluated against the parameters specified in the design brief. The creative process is accepting of false starts, mistakes and dead-ends. The model is fundamentally adaptive and cyclic in that it can be used and modified at will to generate, refine and redefine design activity from inception to fruition on any project. The model can be used to engage with overarching issues as easily as it can be applied to resolving the smallest detail of decision making.

Most importantly conscious implementation of the model, or indeed unconscious deployment of its underlying principles in any random order, creates a rich and hugely rewarding residue of potentiality. This creative potentiality can be set aside and tapped into later, refreshed, revamped and carried forward as both means and motivation in undertaking subsequent design projects tomorrow or in ten or twenty years time. Far from

suffering an absence of creative ideas, or running out of inspiration, the secret to creative designing is always having readily available the means of generating more ideas than can be used in the current project. This provides choice, aids discrimination and helps to refine creative judgement. It also builds the confidence of the professional designer in husbanding creative strategies and managing the creative business of doing design under constantly changing ethical, aesthetic and commercial conditions.

Recalling Heidegger's notion of 'Dasein' as everyday agency, being or living-in-the-world, the Operational Model of Creative Questioning has the capacity to make creative practices explicit in the short term whilst ever it functions 'present to hand' and the '*What if?*' and '*Why not?*' principles are consciously applied by practitioners, teachers and students in responding to design briefs. The Operational Model of Creative Questioning can therefore be seen as an overt means of triggering or targeting creative participation while practising design. In design education, use of the model can provide students with a mechanism for purposefully stimulating their own creative capabilities, whilst they also learn to work creatively with others. Ultimately, the goal in the professional journey from novice to expert designer is for the heuristic principles articulated within the model to be assimilated into the working life of a designer, becoming 'ready to hand', as an implicit and fully embodied aspect of designing within holistic design 'praxis'.

Pedagogical relevance of open questioning for creativity

'*What if?*' and '*Why not?*' are common enough questions - or at least they should be. '*What if?*' and '*Why not?*' are creatively oriented questions because they look beyond the status quo to invoke diverse future possibilities in an open-ended way that invites speculation. By contrast, the somewhat more ubiquitous questions framed in terms of 'what' and 'why', are generally used in educational contexts to pre-empt reiteration of 'facts' and solicit definitive answers that reinforce predetermined knowledge constructs and reproduce previously sanctioned modes of understanding. In most instances questions of 'what' and 'why' asked in relation to assessment tasks abjure freely speculative answers. As such the 'what', 'why', 'when' and 'how' types of questions so commonly found in syllabus outlines and examination papers for example, focus on conformative

learning and passive memory recall as a reaffirmation of past information and agreed interpretation. This demonstrates what Vygotsky calls 'reproductive' knowledge.

'What if?' and *'Why not?'* questions are different. They target 'productive' knowledge and the intentional generation of new interpretations of information that need not necessarily always be predicated on known facts, agreed understanding or proven practices. In postmodern educational settings a potentially anarchic element is thereby introduced into classroom situations wherever students are encouraged to problematise knowledge claims by actively challenging the status quo and asking themselves, each other and the teacher *'What if?'* and *'Why not?'*. Unlike the traditionally didactic approach to education, applying principles of deductive reasoning to the confirmation of predetermined 'truths', the *'What if?'* and *'Why not?'* questions do not aim to generate definitively 'correct' answers. Instead the adoption of what might be reasonably dubbed a 'creative method of possibility generation', without overly much concern for verifiable proof, overtly stimulates a multiplicity of options. Some of these options will undoubtedly be inappropriate under some circumstances. However other options will be more or less promising in achieving fruitful results, others may be particularly relevant but lead to outcomes other than those anticipated. This approach to knowledge generation is cognisant of the serendipitous nature of creative results that forms a fertile wellspring for genuine innovation.

By comparison, questions of 'what' and 'why', typical of most teaching and learning practices, generally fail to encourage creativity. This is because they suppress speculation and thwart alternate creative avenues of enquiry. They privilege an approach to education and training that is based on the objectification of pre-existing knowledge and established skill sets. This sort of conventional questioning is characteristic of what Beckett and Hager (2002) describe as the 'standard paradigm' in teaching and learning. Unfortunately the standard paradigm uncritically perpetuates a Cartesian inspired quest for intellectual certainty and predictable learning outcomes where understanding is built upon sequential reasoning and the increasingly unsatisfactory reduction of complex phenomena to fundamental principles and laws. Under such conditions flexible interpretation of meaning in professional practice is inhibited by the rules of logic and precedent. These

rules perpetuate the assumed reliability of 'factual' data and very often default to linear, chronological or causal relationships considered to underpin performance criteria set out in competency standards for example. Even the formal development of skills in critical thinking in higher education presupposes established principles of logic and adversarial methods of argument.

The traditional approach to teaching and learning, especially in schools and vocational settings, relies heavily upon the teacher planning, managing and maintaining control over not only the content, delivery and distribution of knowledge but also the mode of learning offered to students. Limits are prescribed on student experience and achievement within sanctioned constraints so that the outcomes can be readily assessed and moderated against predetermined criteria. By intention, a teacher dominated pedagogy is concerned with ensuring the consistency and reliability of evaluation practices where students are required to reproduce finite knowledge and demonstrate instrumental skills according to given procedures. The focus on consistency is typical of competency based training regimes where the outcomes of learning are narrowly prescribed in performance standards, mandated nationally in Australia, in industry and government endorsed vocational Training Packages.

In this sort of pedagogical scenario, creative responses are often difficult to accommodate and are therefore neglected, discouraged or ridiculed. Where students deviate from the norm it is considered disruptive and potentially distracting or undermining of traditional teaching methods and authority. For design education such traditional approaches to knowledge generation are anathema and can be creatively counterproductive. A teacher dominated approach tends to suppress or stifle students' initiative in which case learners have little incentive or opportunity to take responsibility for their own learning or creative development. De Bono (1994: 98-106) weighs the merits of 'possibility' against 'certainty' and 'exploration' against 'judgement' observing that, '… sequential thinking demands certainty and absolutes… having to be correct at every step makes creativity virtually impossible'.

A contentious issue in design education is whether creative freedom of thought and action should be offered to students before, during or after the acquisition of foundational

knowledge and skills. Should creative opportunities be a focus of more advanced learning in higher grades or later years or specialist units of a design course or should creative attitude development be integral to the entire curricula from the outset? As a higher order capability some teachers may mistakenly presume that creativity is outside the ken of younger or beginning or novice students. In design education at any level this is certainly not the case because the potential for creativity is an incipient capability observable in curiosity and play from the early stages of human development and throughout life. Therefore learning to design should not force a choice between either creative or practical content. Rather design education should always strive for holistic integration of creative investigation concurrent with the enacted application of relevant theory and practice.

Unfortunately, defaulting to too prescriptive a view of teaching practice tends to perpetuate an instrumental approach to the planning and delivery of much design education. This presupposes a gate-keeping role for the teacher who presides over the sequential and orderly management of design content, and the progressive doling out of piecemeal learning according to staged syllabus requirements. In extreme scenarios the holistic creative engagement of learners is postponed as an end-of-program challenge or reward for students' diligent perseverance in gaining the pre-requisite knowledge and skills. Over adherence to such traditional teacher dominated practices fails to apprehend the integrated motivational basis of experiential creative engagement, which is the very catalyst for design learning. Students whose individual creative inclinations are inhibited or restricted tend to become bored, frustrated, disinterest or else passive, compliant and teacher dependent. Many become increasingly reluctant to venture too far 'outside the square', constantly looking over their shoulders for reassurance while emulating what others are doing. Such learners are risk adverse and fearful of failure. These learner characteristics are often noticeable in primary and junior high school students.

Design students in teacher dominated late or post secondary learning programs may successfully acquire the rudiments of design practice but many will abjectly fail to make the necessary transition from obedient student to autonomous adult learner and independent design practitioner in the workplace. These students tend to lack self-confidence in their own creativity and have difficulty marshalling and manipulating their

theoretical knowledge and technical skill base in the service of self determined creative ends. While their assignment work may be technically good, and their conceptual responses bland or derivative but nonetheless broadly relevant to the assessment tasks, the resulting design submissions lack that vital connective spark of interest or originality to make them noteworthy. Such mediocre design students may graduate without distinction to enter the ranks of the skilled workers and administrators in the design industry. They function reasonably well under instruction but struggle to mature into independent professional design practitioners. Some individuals may even rise to become successful business people who employ other design 'creatives' to inject the vitality and project insight needed to survive in a highly competitive marketplace.

In bringing design students to know what it feels like to be creative, teachers need to provide learners with multidimensional opportunities to explore a range of design possibilities complete with the scope to identify and select the particular knowledge and skills they need to tackle the job in hand. Concurrent access to a scaffold of relevant design knowledge and skills is essential. However teaching to a purely instrumental scaffold of theoretical or technical knowledge or procedural skills should not be seen as a precursor or substitute for holistic and integrated creative design development. This is a critical consideration in design education because theoretical knowledge and practical skills devoid of creative implementation are insufficient ends in themselves when the pedagogical goal is to learn how to design creatively. Scaffolding of interrelated design knowledge(s), skills and attitudes, with permission and scope for creative enactment, assists novices learn 'how' to deal with ambiguity and 'how' to choose between competing options. It guides them in understanding 'how' to identify appropriate conceptual pathways and select from available physical tools and techniques. Furthermore it helps them learn 'how' to shape and apply materials differently and 'how' to scrutinise the quality and relevance of their output in satisfying a larger design purpose. Creative attitudes and motivation render the constituent knowledge and skills meaningful. This is the abiding lesson of studio based project work. Ideally design knowledge, skill and attitudinal development should be offered in tandem, integrated within progressively more complex and challenging project briefs throughout the design curriculum. In this way students are gradually inducted into 'designerly ways of knowing' (Cross, 1982)

whilst engaging holistic strategies for working creatively throughout a course of design study.

For those unfamiliar with creatively oriented studio practices, selective recourse to the Operational Model of Creative Questioning offers design teachers and learners welcome relief from many of the unhelpful assumptions and traditional restrictions present within standard educational practice. *'What if?'* and *'Why not?'* questions embrace complexity and ambiguity along the way toward developing different sorts of parallel understandings. Such a pedagogic approach provides both teachers and students with increased scope and discretion in the execution of contractual learning relationships where interpretive pathways are relatively negotiable and encouraged in response to every design brief. A creative approach to design education admits uncertainty and contradiction as valid strategies for cross-referencing a range of meanings. This assists in coming to terms with different and at times potentially irreconcilable ontological and epistemological perspectives on how things 'are' and especially how or what they might be(come) in the future as a consequence of design effort.

There is an inherently mischievous or dissipating tendency within creativity that is in constant need of guidance and self-regulated discipline if the teacher and the learner are to identify and select the most genuinely productive direction(s) to pursue. Learning to design involves learning to self-manage this tendency. However, real pedagogical advantage lies in the realisation that the *'What if?'* and *'Why not?'* scenarios provide a self-perpetuating basis for learners to make qualitative choices, develop discrimination between alternatives and pursue self-determination in creative priorities and direction. This links learning with experiment and exploration, and promises renewal of enthusiasm for the processes of teaching and learning. It also provides genuine opportunities for deep learning engagement with the ethical dimension of design and education as advocated by Dewey and others.

Investigating the interaction between teacher and learner within the design studio Schon (1985, pp. 48-62) bares ample witness to the operation of the 'what if' opportunities. He describes these as 'choice points' involved in '… a continually evolving system of implications within which the designer reflects-in-action'. In a process of iterative re-

evaluation Schon identifies three factors involved in formulating design evaluations about interim design decisions including the 'desirability of consequences', 'their conformity to or violation of implications', and 'appreciation of the new problems or potentials … created'. Central to this process is the 'stance' adopted by designer, student of design or teacher of design in individually and collaboratively negotiating design iteration in terms of 'double vision'. This means committing to a given creative strategy whilst always reserving 'the right to see and do things differently'. Adopting a stance is part of the ongoing process of identity formation that accompanies all learning especially in professional fields such as design and education. This is where Schon's 'paradox and predicament of learning to design' becomes apparent. Design students are unavoidably required to engage holistically in a fully embodied manner, through 'imitation' and 'listening', in creative practices they do not yet understand. At the same time, by 'showing' and 'telling', design teachers are required to enact and articulate the 'covert' and 'inexpressible' creative decision making and implementation processes inherent in doing design. The goal, according to Schon, is a 'convergence of meaning' that is pedagogically manifest in the development of mutual understanding achieved through the shared teaching and learning experiences involved in designing. Meaning and identity formation are concurrent and ongoing processes of learning for both teachers and learners of design that continues throughout a practitioner's career.

Describing this as 'coaching artistry' Schon (1985, pp. 63-82) discusses these circumstances in terms of a constructed '… dialogue in the media of words and performance … (where) there is a language of appreciation… a language of performance … (and) a language *about* design'. Central to Schon's analysis of what is going on between protagonists in the design teaching studio is the acknowledgement that in the processes of learning to do design creative engagement involves significant psychological risks for both the novice learner and the novice or even the experienced teacher. From the outset design students are acutely aware of their own ignorance and vulnerability. Beginning design students are not permitted to be disengaged or passive learners because they are openly called upon to demonstrate in-principle faith and enacted trust in the creative potential of peers and the creative leadership of their design 'coach'. This predicament demands what Schon calls a 'willing suspension of disbelief' from each

individual student. It is the only means by which the student can enter into an implied contract of sorts with the teacher whereby he or she voluntarily plunges physically, emotionally and intellectually into the new studio experience '… without knowing ahead of time what it will be like'. The commitment and personal cost for the individual student is high, often involving acute anxiety and an immediate crisis of confidence associated with having relinquished personal autonomy and equilibrium in an unfamiliar learning situation, where they then struggle to function '… without competence, without control, and indeed, without understanding'. Learning to design is like learning to swim. When jumping into the deep end it helps not to think about drowning. Provided learners suspend disbelief and hold their breath while immersed in the unfamiliar medium of design they soon feel themselves floating to the surface at which point embodied creative instincts and design coaching can take over to enhance their performance.

The design teacher or 'coach' is also prone to feel personally vulnerable with respect to his or her ability to quickly win the confidence of a new group of novice designers sufficient to elicit the necessary creative and attitudinal 'leap of faith'. In the first instance the burden of design performance falls not on the design student but rather on the design teacher who has no alternative but to holistically model or act out creative design practices. Using demonstration the design teacher hopes to be able to explain what he or she is doing while actively designing. This must be convincingly achieved in the early delivery of a design course without the benefit of a shared design language. Well before the teacher can be confident that learners are genuinely assimilating the design understanding into emotion, mind and body students must grapple with new and often unfamiliar visual, verbal and fully embodied modes of creative communication. Before students can learn to draw for example they must be shown how to use their powers of observation to look differently at what they see and then translate this 'vision' into tangible images to discuss with others. Before they can begin to design students must somehow be coaxed to 'envisage' the possibility of an alternative to reproducing the status quo. Before designers can imagine something new they must learn to ask *'What if?'* and '*Why not?'*.

The perception of personal risk for the novice design teacher is heightened by a dual anxiety over not only their ability to teach but also misgivings about the resilience and reliability of his or her own creative abilities. They may doubt the level of their own design expertise and question their own grasp of the subject matter to be taught. Beginning design teachers are very prone to experiencing deeply felt ambivalence about the range and fluency of practical and conceptual skills required for them to perform creatively on cue in front of a class. The perception of personal vulnerability and professional risk is exacerbated by a fear of appearing vague, incoherent or incompetent. Uncertainty stems from the tacit nature of their own grasp of creativity and a potential inability to explicitly describe creativity and expose the implicit nature of what he or she is physically, psychologically and mentally doing when engaged in the integrated 'hot action' of designing (Beckett 1996, pp. 135-149). Confidence in teaching design is not the same as taking time out to achieve a level of design expertise in private design practice, which brings with it increasing professional confidence in doing one's own designs - in a private or professionally 'safe' place. Design teaching puts the enacted creativity of the teacher on display for students and others to scrutinise.

For novice design teachers, coaching or mentoring design students is different from technical instruction because it demands an appreciation of higher order meta-learning processes. Such a career move from practising independent designer to teacher of design in an institutional setting includes engagement with three levels of creative reflection-in-action. Firstly new design teachers must come to terms with the double-loop learning of creative design processes needed to become an expert practitioner of design. Secondly there is an additional double-loop of learning involved in coming to terms with educational practices needed to become a teacher of design. Thirdly the novice design teacher must concurrently reflect upon what it feels (felt) like to be a novice learner of design prior to learning the language or acquiring the underpinning experience that comes with knowing what it means to 'be' a professional design practitioner.

Acknowledgement of the complexity of teaching for creativity in design education is central to an appreciation of creativity as a higher order capability. Most trainee secondary school teachers of Design and Technology in NSW for example function

outside the community of professional design practice. They enter university and complete teacher training courses in faculties of Education without necessarily ever being exposed to the sort of authentic design education available in parallel faculties or departments of Design in universities or vocational institutions. Thus secondary design and technology teachers often find themselves adopting the role of commentators and observers of design because they rarely have an opportunity to build the specialist creative capabilities needed to make the transition from novice to professional design practitioner working in authentic industry or community contexts. It could therefore be argued that a creative deficit exists in many teacher education courses in three significant respects. Firstly there is a potential gap in secondary teacher understanding of the design field as a creative profession. Secondly this also implies relatively poor development of individual teacher creativity with respect to understanding the holistic and embodied nature of the lived experience of being actively creative that is essential in professional design practice. Thirdly it indicates a likely lack of first hand insight amongst beginning and indeed some very experienced school teachers into what is pedagogically required to overtly nurture a professional approach to personal and collective creativity in design students.

Similarly, many design practitioners who take up design teaching part time or even full time in universities or vocational institutions may not necessarily have had the benefit of any pedagogical training prior to commencing teaching. In which case they may understand what it means to be a professional designer but not what it means to be a professional teacher. As a result novice design lecturers working in the tertiary sector often model their educational practices either on what they witnessed as students of design or what they see going on around them in educational institutions. Where the professional designer is offered professional development toward becoming a professional teacher it is most unlikely that this will extend to a pedagogical analysis or appreciation of creativity in any formal way within the theoretical context of generic teacher education or vocational train-the-trainer programs. Reflective practice may be discussed as a generic principle, but most likely in terms of the new teacher reflecting upon his or her own learning experiences in the traditional school, college or university education context. Certainly there is no discussion of creativity in the nationally endorsed

Australian Qualification Framework Certificate IV in Assessment and Workplace Training recently superseded by the Certificate IV in Training and Assessment. This represents the minimum mandatory qualification for trainers working across all disciplines in the Vocational Education and Training sector in Australia including the design domain. The best that can be hoped for is that the new teacher of design draws on personal experience of 'being creative', applies an intuitive ability to communicate on creative matters and implicitly understands the collaborative nature of design studio experience. This will enable industry practitioners to start teaching design even if they have not yet reflected upon the educational implications for engendering creativity in others.

Hence it is not so remarkable that pedagogical appreciation of the higher order capabilities required to actively teach for creativity in design education has not been well articulated to date. To a very large extent creativity remains tacitly understood by design practitioners and design teachers alike. This observation is verified by data collected for this research into creativity as a higher order capability from members of the Design Institute of Australia (Appendix 1). Therefore, creativity still represents a largely abstract imponderable for the vast majority of design and design education students in schools, vocational institutions and universities. Creativity is generally assumed to be a by-product of the design process itself with scant attention being afforded to investigating the implications of individual and shared creativity for managing the teaching and learning dynamic.

Some notable exceptions presumably do exist. For example, there are selected university programs targeting the creative industries and discrete education programs specifically developed for gifted and talented children. However, even these tend to focus on creativity in terms of particular 'thinking' strategies and 'problem solving' techniques or new technology platforms or special industry or community interrelationships rather than as a fully embodied creative pedagogy based on an alternate worldview for both teacher and learner. A not uncommon view in tertiary level design education in Australia for example is that creativity is a delicate matter, best left to emerge (or not) of its own accord. Privately, this was made apparent at the outset of this investigation in views

volunteered by a prominent postgraduate program manager of design, who preferred not to be identified, offering an informal opinion on the role and importance of creativity in design education:

> There would be quite a few people… that would say creativity in students is the result of an attitudinal position of staff and students. Staff stand back. Students feel that it is OK to experiment and try things. Where you come unstuck is when you try to meddle with it. The worst thing you could probably do is be negative … (to) say 'no'… has disastrous results… I think creativity is a bit of a mystery. You almost feel that you can't take any credit for it because you just let the students go and they get really interesting solutions. (Anonymous 1999, informal consultation)

Nevertheless a mounting weight of theoretical evidence suggests that, by conscientiously focusing on the shared nature of lived experience and attending to the issues of embodiment and emotion for both teacher and learner, it is indeed possible to establish a substantive appreciation of how creativity operates holistically in the world. The Operational Model of Creative Questioning offered here, based as it is on *'What if?'* and *'Why not?'* questions, demonstrates a useful and readily accessible teaching strategy for overtly encouraging the development of creative attitudes in students. The same model can also be used by teachers and teacher educators to increase creativity in their own teaching practices in design as well as in many other content areas and professional disciplines.

The *'What if?'* and *'Why not?'* strategy is pedagogically designed to be proactive, to dispel complacency and disrupt over reliance on certainty in order to stimulate creatively oriented attitudes toward learning and the growth of new knowledge and skills in the context of design education. The incentive behind the model is an understanding that meaning is contingent and malleable, and identity development through education is evolutionary and specific to the individual and to the field of endeavour. Interpreting creativity in design education as a 'meme' involves acknowledging the need for intentional, as well as intuitive, engagement with a wide range of social, cultural, contextual, theoretical, practical and experiential forms of knowing that are holistically integrated through a process of reflection-in-action.

In particular the socially conditioned values and situated attitudes, priorities and practices underpinning beliefs about the nature of design, creativity and education serve to activate an appreciation of 'difference' and contextualise the formal and informal insights with

which designers are known to work. This activation occurs within specific learning scaffolds as first indicated by Vygotsky, and later characterised by Schon in terms of a 'ladder of reflection' that links sensate engagement with the world and implicit know-how with explicitly speculative design processes, practices and outcomes. Curiosity and confidence build as students and teachers voluntarily step up from the known to the unknown and visa versa as they actively seek to move from the possible to the actual. By adopting strategies that intentionally render the familiar unfamiliar new potentialities are laid open to question, re-examination and reanalysis. This creative 'power' to look at the world differently has been shown to be especially relevant when considered in light of Lyotard's suggestion that a postmodern perspective on innovation:

> … is changing the meaning of the word *knowledge*… producing not the known, but the unknown… (that) has as its basis difference understood as paralogy…It is necessary to posit the existence of a power that destabilizes the capacity for explanation, manifested in the promulgation of new forms of understanding or… in a proposal to establish new rules circumscribing a new field … this property implies that "discoveries" are unpredictable… it is a factor that generates blind spots and defers consensus. (Lyotard 1979, pp. 60-61)

Locating creativity in design, education and design education practice

In terms of professional design-related practices, the power of creativity has long been tacitly understood and implicitly acknowledged as a catalyst for successfully navigating new areas of opportunity, constructing alternative options for action and managing change in discipline specific applications. Furthermore, it is clear that many of the typical features of creativity are seen to operate quite overtly in a very wide range of innovative or creatively oriented activities and professions in parallel to that of design. Schon (1985, p. 7) goes so far as to suggest, 'Among observers of the professions, it has become commonplace that all competent practice involves a kind of design'.

Here the work of Wenger (1998), in *Communities of Practice: Learning, Meaning, and Identity,* provides an extremely useful theoretical platform for synthesising many competing contextual issues that impinge upon, and potentially confound, an emerging pedagogical understanding of creativity. Using 'learning, meaning and identity' as a frame of reference creativity can be readily identified as a particular form of situated learning embedded within the 'doing' of design and 'engagement with the social practice' in both design and design education. Figure 7.2 below situates the notion of teaching for creativity

at the nexus of three interdependent communities of practice, which represent overlapping professional fields of 'design practice', 'education practice' and the hybrid discipline of 'design education practice'. As previously mentioned, at some point in learning throughout life most people encounter issues of practice relating to what Csikszentmihalyi (1996), Gardner (1999) and other theorists refer to as 'small c' creativity relevant to the individual on a personal or local level. However, those who elect to pursue a course of study or professional career in design, in education and/or in design education inevitably are confronted with the memetic implications and community expectations of 'big C' creativity. This equates with the phenomenological notion of intersubjectivity involving a creative slippage between 'narrow' versus 'broad' community relevance of designing, which cannot be meaningfully separated one from the other. Teaching for creativity therefore demands attention to both 'small c' and 'big C' creativity in both narrow and broad community contexts.

'Big C' creativity encompasses many 'small c' creative considerations. It takes the human engagement with creativity beyond the personal and private onto the social level of practice moving into the 'meme' dimension in terms of broader community and/or commercial design relevance. 'Big C' creativity applies to professional awareness, expert engagement and community based participation in culturally oriented creative design activities. Individual design, education and/or design education practitioners activate and promote creativity by working in education or design related workplaces, applying their higher level capabilities in a wide range of specialist fields. These specialisations include fashion, graphic, interior or industrial design, or architecture for example. 'Big C' creative participation brings with it professional challenges and responsibilities to expand creative scope and influence by working collaboratively with others on small team projects as well as large scale or high profile initiatives.

The aim is to encourage collective creativity. It has long been recognised that professional opportunities exist for practitioners to 'think locally and act globally' in different ways, with respect to the individual and social implementation of creative learning, meaning making and identity formation for themselves and others, through design and education practices. It is only at the shared level of creative engagement with design issues that

practitioners can implement the significant social, ecological or environmental changes needed to deliver lasting improvements to the conditions of human life and the sustainability of human practices. These 'big picture' issues, raised previously in relation to design context, emphasise the increasing importance now being placed on ethical responses to social and community priorities in professional design, education and design education practices at every level.

Figure 7:2. Three interrelated communities of practice (after Wenger, 1998).
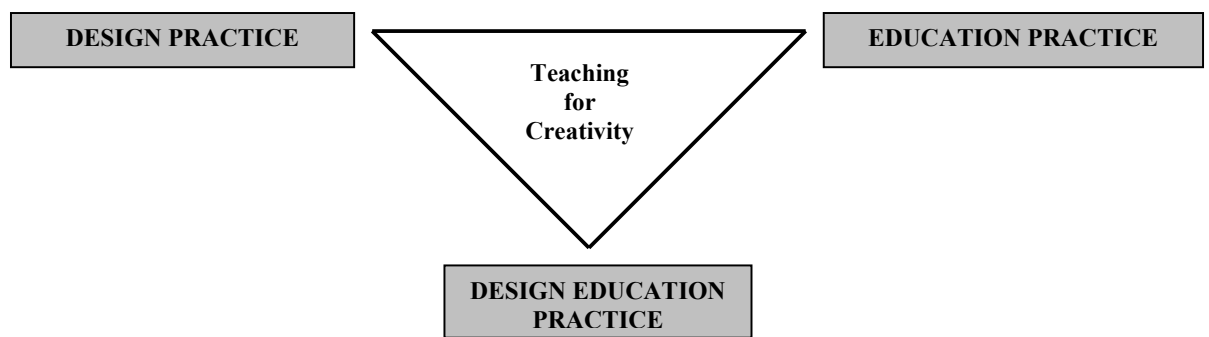
Wenger explains the notion of communities of practice (Wenger, 1998) as '… a social theory of learning' that revolves around four critical considerations of 'meaning', 'practice', 'community' and 'identity'. He argues that:

> … many different kinds of learning theory … reflect a deliberate focus on … the multidimensional problem of learning, and … more fundamental differences in assumptions about the nature of knowledge, knowing and knowers, and consequently about what matters in learning … A social theory of learning must … integrate the components necessary to characterise social participation as a process of learning and of knowing … (Wenger, 1998 pp. 3-5)

For creativity to be 'learned' it must be understood as a fully embodied 'experience' that can be accessed, known and felt as a result of 'doing' design. Learning to 'do' design creatively can be said to actively inform a sense of 'belonging' through membership of one or more of the overlapping communities of design, education and/or design education practice. Therefore creative understanding and creative participation are shown to be indispensable aspects of 'becoming' a designer, but also in potentially becoming a creative educator and most particularly in becoming a creative design educator. This interpretation of creativity is consistent with Csikszentmihalyi's three components of

creativity that focus on the necessary interaction between 'domain' or professional discipline, 'field' or official body of expertise and the individual 'person'.

Figure 7:3. Below illustrates how fully embodied and enacted creativity in design education can be understood in relation to the various components of Wenger's social theory of learning (Wenger, 1998, pp. 3-15).

Figure 7:3. Creativity and design in Wenger's social theory of learning
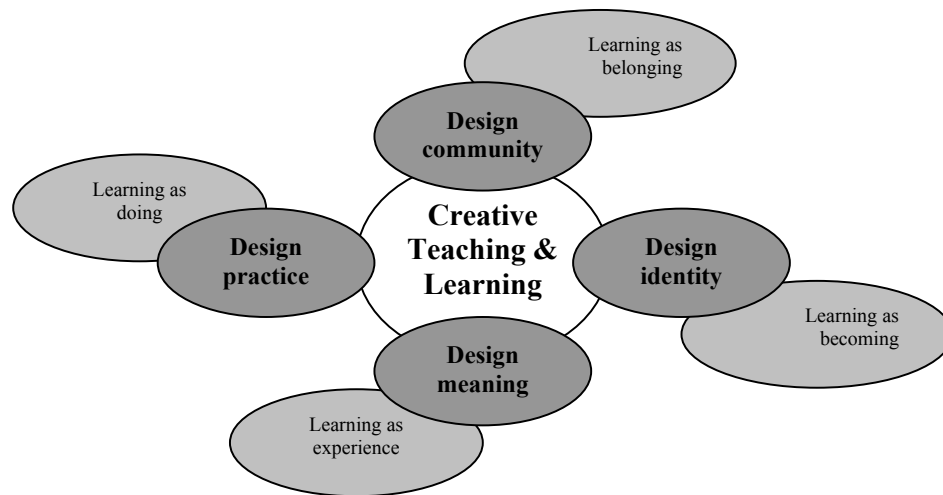
The formal community of practice in design can be identified narrowly as encompassing individuals that operate within the professional community of practising designers, design employers, design networks, design associations, foundations, galleries, museums, design institutes and university design faculties. Equally there exists another much broader interpretation of the community of design practice, which adopts the 'meme' perspective to include the broader social, cultural and historical dimensions of the global design industry. Here stylistic trends can assume icon status and specific design movements emerge as hugely influential beyond the life and times of the individual design practitioners or institutions that instigate them. Such is the case with Bauhaus design principles and practices noted earlier. The creative signature of a designer can and regularly does evolve into a prominent brand and product range that continues to assert an influence that drives popular taste far beyond the reach and relevance of the originator or initial designs put into the marketplace. This broader interpretation of the community of

design practice admits the influence of clients and consumers into the frame of reference. It acknowledges public participation in the promulgation of design through consumer purchasing, advertising, specialist publications such as magazines, multi-million dollar global manufacturing and distribution networks, franchised retail outlets, ever expanding product ranges, dedicated aficionados and avid collectors for example.

Fashion history is replete with evidence of this expansive meme phenomenon in creative design practice growing out of narrowly specific origins. Take for instance female French fashion designer Coco Chanel (1883-1971) who is a renowned harbinger of stylistic evolution. Coco Chanel rose to prominence as a design practitioner in Europe in the early to mid twentieth century. After World War II her stylistic and business interests expanded exponentially to include an international reputation that still survives well beyond her social and cultural milieu, not to mention beyond her individual lifetime. The propensity for the success of Chanel relies on a reputation for sustained creativity and aesthetically authentic and situated production values that gave rise to a prestige brand, plagued by myriad forms of mass-market imitation. Chanel creativity in design and taste now exists (alongside the imitations) as a self-perpetuating cultural phenomenon. As a business empire in its own right Chanel spans the globe with sustained inter-generational appeal far beyond the production (and reproduction) of the original designer garments to include contemporary fashions and all manner of luxury accessories, cosmetics and perfume. In this respect the memetic cultural impact of creative design is undeniable.

Before creativity can become transferable, however, learning to be creativity needs to be anchored or 'situated' within domain specific bodies of knowledge and skills sets. By necessity creativity is contingent upon context and the particular disciplinary applications critically associated with different fields of design. For example, the key considerations and outcomes of creativity in fashion design differ both subtly and substantially from creative input and outcomes in interior or graphic design. Fashion design deals with the creative transformation of two-dimensional fabric into tangible three-dimensional garments designed to clothe an animated human body with style. By comparison interior design manipulates the ambience, mood and functionality of three-dimensional volumes, spaces and environments in fixed locations. Interior design involves the creative

containment of inanimate objects within walls penetrated by windows, doors and thoroughfares coupled with the visual and tactile definition of surfaces, finishes, fittings and furnishings. Taken together this constitutes purpose-designed human habitats. Graphic design deals in another realm altogether. It focuses on the combination of two dimensional text, messaging and image making in print or four dimensional electronic communication formats and virtual reality giving consideration to time displacement, real or animated movement in TV, film, internet and other digital applications.

While creativity in parallel domains of music, dance or even science may be said to exhibit similar characteristics to the creativity operating in design, the experiential frames of reference remain fundamentally different. Nevertheless, the *'What if?'* and *'Why not?'* approach to engendering creativity holds remarkably true because it permits the situatedness of the contextual criteria to flex in response to idiosyncratic disciplinary content, criteria and process variables. The implementation of creativity in each field of design, as in other creative disciplines, simply draws upon the lived human experience of different forms of sensory embodiment and diverse motivational sources. More than any other explanation this perhaps accounts for why creativity has so persistently defied generic academic definition. Since creativity within different communities of practice is a fundamentally contingent phenomenon there is no stasis. Hence a simple 'once and for all' explanation of creativity in the rhetorical tradition will never suffice in terms of prescriptive notions of verifiable 'fact', 'definition', 'quality' or translative 'jurisdiction'.

In an article titled 'Rethinking the Concept of Community Practice in Relation to Schoolteachers' Workplace Learning', along with later theoretical work, Hodkinson and Hodkinson (2004) critically compare narrow against broad interpretations of Wenger's communities of practice. This research examines the nature and circumstances of teacher learning in four creative departments of art, music, history and information technology in two secondary schools in Britain. The investigation is relevant in locating the role and application of creativity within the three contexts of design, education and design education as three discrete yet overlapping communities of practice. Reflecting on Wenger's communities of practice, in relation to the earlier work of Lave and Wenger (1991) on situated learning, Hodkinson and Hodkinson refer to the work of Bourdieu and

Wacquant (1992) on 'habitus'. Habitus is taken to mean the '… deeply held and often sub-conscious dispositions, which orientate an individual's practices in any situation'. Therefore, in terms of 'habitus' creativity is perhaps best characterised as a generative disposition or inventive attitude that motivates and orientates the development of specialist discipline-specific knowledge, skills and practices of individual designers, teachers and design educators. 'Habitus' also impacts upon the evolving creativity of learners as design students, as teacher education students, as well as participants in any learning situation where the aim is to stimulate originality, innovation or creative self-actualisation. This constitutes a 'narrow' interpretation of situated learning that focuses on individual achievement within one or other specified community of practice. However it does not address collaborative learning within a multifaceted professional domain such as design, especially where design creativity relates to more than one disciplinary field of application.

In their ongoing research Hodkinson and Hodkinson examine collaborative practices as an 'additional dimension' of workplace learning for teachers working in creative contexts. They contemplate the importance of 'belonging' to a community that stems from 'membership' in a 'field' such as art, music, history or information technology. In particular they focus on the need to retain both the broad and narrow appreciation of implications for involvement in parallel, intersecting or overlapping communities of practice. Support for teamwork and collaboration, that encourages a sense of 'belonging' derived from group membership as processes of 'becoming', appears equally important for developing individual creativity, personal identity and professional commitment of design teachers as it is for developing these same attributes in design students.

There is a slippage between 'being' a student of design and 'becoming' a designer and/or a teacher of design aligned with a particular disciplinary field such as fashion, interior or graphic design. Novice and expert practitioners exist in a perpetual state of 'being' and 'becoming' throughout life irrespective of whether they work alone or together with others, within or outside their specialisation. Therefore there is an inevitable layering of narrow and broad engagement with the creative requirements of overlapping communities of practice. Hence, from a pedagogical viewpoint, educating for creativity in design is

dependent upon parallel induction of individual teachers and learners into at least two levels of practice. Firstly teachers and learners of design must collectively engage with close-knit vocationally oriented communities of design or design education practitioners that set the specialist occupational criteria for what constitutes professional practice in their chosen field of design expertise. Secondly, and perhaps more importantly, teachers and learners must concurrently develop a broadly informed awareness of the social relevance and potential scale of impact of creativity in design across the whole design domain that encompasses all the different design fields or disciplines. The latter tends toward a memetic consideration that highlights the roles and influence of design professionals in society and calls for personal appreciation and collective commitment, as well as individual and joint participation, in managing the cultural and community responsibilities of design(ing).

It is true that design functions as a key factor in shaping social consciousness and community environments by creating cultural produce, styles, and trends in any given era or territory. When considered as style, creative influences often transcend individual fields of design specialisation so that design as a whole is often coherently symbolic of its historic place and time. This is particularly true in consumer societies where designers conscientiously anticipate and actively cultivate the image and form of every object or device. In many instances designers overtly orchestrate the social take-up and (re)valuing of goods and services by determining the nuances of shifting styles and taste. New or redesigned products are then commercially promulgated through focussed brand marketing, where product designers work in conjunction with graphic and digital designers to generate visual communication and marketing strategies for a wide range of media. The cultural impact of style is very clearly demonstrated in the classic to contemporary evolution in the visual appearance of automobiles for example. To a certain extent brand differentiation and international market competition in the multimillion dollar automobile industry turns on the success of each new model of car. This is despite the fact that the internal mechanics, electronic systems and road performance may change much more slowly from one model to the next than does the external styling of the vehicle. Cars produced by different manufacturers may look different when in fact they very often contain identical functional components. Therefore designing a car has as

much to do with shaping the community perceptions, social aspirations and personal experience of driving or travelling in the car as it has to do with enhancing the performance of functional engineering or production specifications.

Awareness of the intersection between different levels of narrow and broad creative engagement across differing communities of design-related practice is equally valid in foundational design education in secondary schools as it is in the delivery of higher level specialist design or teacher education courses in vocational or higher education. The critical contextual issues remain consistent, as does the need to integrate holistic understanding of creativity within design learning and design teaching. At all levels of education both the narrowly specific and the broader community considerations must therefore be addressed to achieve a well-rounded participatory understanding of what it means to practice as a creative designer working or teaching in response to local, national and international considerations. The creative challenge for the design educator is to strike an appropriate balance. A depth of understanding of the different bodies of professional knowledge, skills and creative attitudes is required to concurrently fulfil the 'cohesive social relations' involved in reconciling the interdependent roles of designer, educator and design educator operating within three intersecting communities of practice. Here Hodkinson and Hodkinson (2004, p. 25) caution that, '…when researchers and writers use the term 'community of practice', they need to be clear about the sense in which they do so, and the scale at which the concept is employed'.

This examination of creativity in design education distinguishes three different communities of practice. Design practice, education practice and design education practice each require membership within one or more professions as designer, teacher or specialist design educator where creativity is an indispensable cultural determinant. The scale of pedagogical interpretation of these intersecting communities of practice embraces both 'small c' individual creativity and 'big C' memetic creativity correlating narrow with broad frames of reference respectively. This contingency helps to differentiate and locate the crucial function and relevance of creativity as a higher order capability in design education for individual teachers and learners and the professional communities of practice to which they relate.

Reconciling creativity, learning theory and design practice

The principle of surface and deep learning articulated by Ramsden (1992) provides another theoretical learning perspective that assists in triangulating a better appreciation of how creativity as a higher order capability is made teachable in design education. Linking the concept of surface and deep learning to Schon's principles of reflective practice and Wenger's theory of communities of practice helps in validating the relevance of the Operational Model of Creative Questioning as a means of pedagogically targeting creativity in design education. This validation is further substantiated by the notion of perplexity espoused by Russell (1999). The theoretical veracity of each of these previously unrelated theories hinges on a shared concern for cultivating self consciously productive attitudes toward holistic learning. The introduction of perplexity provides a key motivational ingredient so often overlooked in the discussion of teaching for creativity.

Discussing fundamental pedagogical issues in learning to teach in higher education Ramsden (1992) analyses a wealth of prior research in relation to the conditions and characteristics of surface and deep student learning as shown in Figure 7.4.

Figure 7:4. Surface and deep learning (Ramsden 1992, pp. 42-43; after Marton 1988, p. 66)
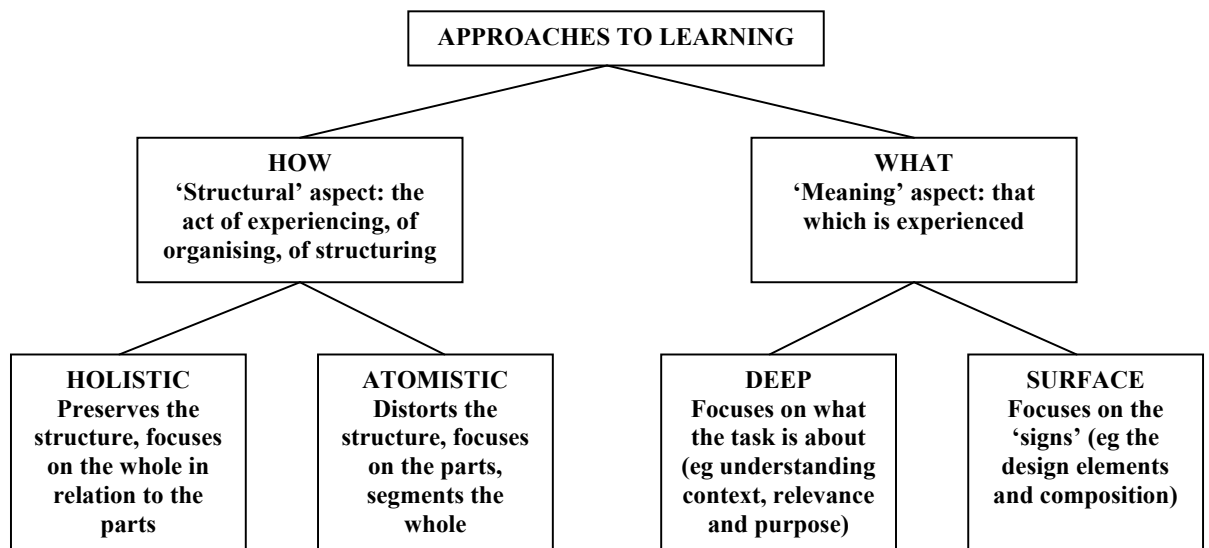
Surface learning is known to be short lived and superficial where students resist personal engagement with designated learning activities except to skim and regurgitate the information needed to pass instrumental assessment tasks. When students consider learning activities an arbitrary 'external imposition' they tend to deal with the information in a cursory, disconnected and piecemeal manner showing little regard for the underlying meaning or the overarching purpose of the learning. In short with surface learning students seem to approach educational tasks with no real desire or intention to understand. As a result surface learning is temporary and soon forgotten, and therefore inconsistent with the notion of sustained creativity as a higher order holistic capability. Deep student learning by comparison has been associated with an individual desire to understand and learn from the educational experience. Students value the learning opportunity and willingly engage in the search of holistic meaning. They look for connections and an underlying structure that they can relate to personal real life experiences of the world. With deep learning students show interest in the purpose of the learning tasks and seek to communicate their own understanding and interpretation of the key considerations to their peers and teachers. These students put effort into organising the information as a means of achieving some overarching goal, which enables them to retain, transfer and apply learning in different situations. A deep learning approach is conducive to the growth of creativity as a higher order human capability in design or any other field.

Surface learning is not conducive to creative development because it reflects passive resistance, a general lack of interest and a temporary preoccupation with the 'signs' or components that characterise instrumental information and atomistic skills. When studying, surface learners tend to concentrate on identifying or memorising 'what' they think they should reproduce to pass a pending examination or else they mimic the procedures required to demonstrate a basic level of competency in practical assessment tasks. There is little or no expectation that the knowledge or skills are likely to be useful to them in the future. Whereas deep learning demonstrates a holistic approach where students are willing to assimilate knowledge and skills by actively seeking to integrate meaning, establish relevance and achieve proficiency in its application to a variety of tasks. In deep learning students show concern for 'how' information can be structured to enhance understanding. The informational and experiential components of learning are

correlated and expanded into useful and personally relevant bodies of transferable knowledge and skills. Suggesting that all students deploy both surface and deep learning under different circumstances Ramsden (1992, p. 44-58) distinguishes deep learning in terms of a positive internalised 'relationship' between the student as a whole person and their 'doing' of some meaningful learning task. He deduces that it is 'absolutely critical' for teachers to understand that, 'In trying to change approaches (to learning), we are not trying to change students, but to change the students' experiences, perceptions and conceptions of something'.

While admitting that it is probably not possible for teachers to direct or otherwise instruct students in the application of deep learning, Ramsden's research confirms the 'extremely robust' nature of the pedagogical links between a deep approach to learning and attitude formation. 'What' students learn depends to a very large extent on 'how' they experience the learning. Deep approaches to learning that involve the exercise of imagination, flexibility and adaptive skills sets have been shown to result in '… higher quality outcomes and better grades. They are also more enjoyable… (when) associated with a sense of involvement, challenge and achievement, together with feelings of personal fulfilment and pleasure'.

With respect to teaching for creativity it is therefore important for teachers to appreciate that deep holistic learning is attitudinal and emotional, not instrumental and technical. Deep creative learning in design is a function of holistic student engagement with not only the perceived meaningfulness of the design task, as measured against external criteria, but also the internal relevance for them as individuals in undertaking or doing the design learning in a conscientiously creative manner. This depends not so much on a detailed description and delivery or abstract theoretical discussion of 'what' creativity is. Rather it is once again an invitation for teachers to model 'how' creative attitudes and performance can be used to leverage course content and skills to build personal meaning and understanding into culturally relevant design outcomes. Deep learning is perhaps the only way students can achieve genuine understanding and ownership of creative learning outcomes. Hence when targeting creativity in design education, as a pedagogical intervention intended to encourage a deep approach to learning, teachers and learners

must appreciate that it requires the conscientious deployment of heart, head and hands on each and every design task by both parties. Joint commitment to creativity arises from shared belief in the merits and potentiality of creative design. It relies on a degree of trust and co-operation developing between teachers and learners where collaborative participation in the educational exchange is valued as an opportunity for personal growth and mutually rewarding life experiences.

One final consideration, underpinning the application of creativity as a higher order capability in design education, involves developing a better appreciation of the positive role that 'perplexity' can play in activating and sustaining student interest and task commitment. Before engaging creatively with a design brief the interest and curiosity of students needs to be stimulated in some way. As argued previously with respect to the theoretical limitations of problem solving as an insufficient characterisation of creativity, design and learning, Russell (1999) directs attention onto the pedagogical importance of 'perplexity'.

Perplexity is a readily discernible affective state by which students become aware of what they do not yet know or understand about some real or hypothetical design situation. If this 'unknowing' predicament is framed positively, especially with respect to Merleau-Ponty's 'I can' principle discussed previously, then the realisation that there is a gap in current design knowledge and experience can stimulate students to explore the potentialities implied within a design brief. In this way curiosity is sparked and students can then work individually or collaboratively in conjunction with teachers to articulate the scope of contingent design possibilities. To succeed this requires teachers to conscientiously build some open ended creative challenge into the project outline. Students must then be encouraged to exercise some initiative beyond mere recapitulation of surface considerations already specified as design criteria in the brief. Design tasks should require students to analyse, interpret and extrapolate the criteria in the design brief and to actively 'do' something creative in response to an identified need. To be effective there can be no option for passive or imitative responses because this obviates the design purpose. Each design student needs to be made well aware that they are required to generate a relatively novel, if not entirely unique, visually and practically 'designed'

outcome. That this will most likely involve a 'small c' creative response relative to each individual's prior experience is perfectly acceptable provided it demonstrates a genuine depth of personal engagement with the design task and a striving toward a creative achievement.

Perplexity entices students to probe into the unknown and begin engaging in deep and personally meaningful enquiry. It requires a conscious effort from students to remedy deficits in personal knowledge or skills by seeking out, finding, exposing and utilising different source information or unexpected practical aspects in the necessary design learning. This is not a linear but rather an iterative process. Dewey (1933) is perhaps one of the first theorists to link reflective learning with the positive outcomes of perplexity:

> Demand for the solution of a perplexity is the steadying and guiding factor in the entire process of reflection… This need of straightening out a perplexity also controls the kind of enquiry undertaken… the origin of thinking is some perplexity, confusion, or doubt… There may, however, be a state of perplexity and also previous experience out of which suggestions emerge, and yet thinking need not be reflective…One can think reflectively only when one is willing to endure suspense and to undergo the trouble of searching. (Dewey 1933, pp. 12-16)

Noting that creativity involves many different aspects of contextual as well as conceptual and practical complexity, it therefore follows that an incipient state of perplexity is intrinsic in all design activity. The challenges and opportunities associated with change call for future oriented design applications. This potentially heightens anticipation and injects vitality into creatively perplexing design tasks. Citing Schon and others, Russell suggests that experts are likely to have a 'high tolerance for perplexity'. This implies that novices need to develop curiosity in association with pragmatic action oriented ways of dealing productively with perplexity when learning to design. Emphasising the merits of project based learning, as a means of placing design students in the way of perplexity, Russell (1999) observes:

> … perplexity is located, for the student, in the power-relations of the (design) profession… when we move to the realm of the known, as teachers, the experiment remains inside the comfort zone of the professional. Somehow… it (comes) down to having and replicating particular professional experiences rather than the having of the experience of perplexity itself… Experience minus perplexity is knowledge at a distance… Ignorance is often perceived as a state of frustration not to be tolerated for too long… (however) transfer of difficulty and its attendant loss of engagement is a readily identifiable cause of concern in all learning… Unless there is a personal demand for a solution (I must resolve this) there is no self direction or genuine interest and no reflection because there is no problem owned by the learner. First own the problem of the problem and perplexity, then learning will follow. (Russell, 1999, pp. 1 & 8-9)

Hence, it is extremely productive for all those (students, teachers and others) with an interest in using creativity to explore what it is that they do not yet know in design, to rhetorically ask themselves and each other *'What if?'* and *'Why not?'*. These are inventive and dispositional questions ideally suited to the situated specificity of design investigations taking place in the classroom, studio or workplace. In the context of design and technology education Williams (2004) agrees that asking *'What if?'* in the context of designing and making activities offers 'new ways of firing pupils' imagination'. Coupling *'What if?'* with *'Why not?'* propositions assists in launching a content free operational approach to questioning possibilities and expanding probabilities. This approach can be applied to holistic cognitive and corporeal design effort. It homes in on, not so much the theory but, the physical and intellectual enactment of creativity as lived experience in design education. It helps to reliably stimulate perplexity and promote curiosity without necessarily framing every design opportunity or experience as a problem.

The Operational Model of Creative Questioning deploys *'What if?'* and *'Why not?'* queries to demonstrate explicitly how design project constraints and other contextually relevant information, supplied in design briefs or identified independently, can be intentionally rendered malleable as raw material in (re)shaping a range of different possibilities. Such an approach helps to define and refine a whole host of alternate options into potential design resolutions from which the most promising can be selected. Such an approach to teaching and learning design carries no onerous burden of infallible 'correctness' when determining a number of profitable lines of enquiry. It avoids unnecessarily limiting either the pathways or the outcomes of the new design learning to set problems, preconceived procedures or known solutions. This simple pedagogical strategy is generative, adaptive and iterative. It tolerates uncertainty and accepts ambiguity. The *'What if?'* and *'Why not?'* approach to educating for creativity projects students into future oriented deep learning or what Russell (1999) describes as a:

> … gesture of anticipation that amounts to taking up the position of the learner and/or professional. Unless this gesture is made, unless this position is taken, there can be no real problem-based learning. The alternative gesture is that made by the student experiencing what is known as the imposter syndrome… Here the perplexed individual foresees the possibility of their own failure through the lack of meeting the identity requirements of one-who-comes-to-know. What they make, instead, is the gesture of inadequacy. (Russell 1999, p. 10)

The Operational Model of Creative Questioning, first introduced in Chapter 2 and discussed in more detail in this chapter, hinges on the promulgation of a creatively flexible and inquisitive attitude to holistic designing. Interim design attempts are rendered perplexing and therefore intriguing and fascinating in some way. The number of multiple options generated enhances the probability of finding a relevant and interesting solution. In design, creative perplexity is seen as a positive state of being that sparks interest in potentialities and encourages ongoing proactive experimentation. Perplexity provides a necessary catalyst for meaningful design reflection and collaboration. Best practice in creative design education finds little merit in reiterating finite solutions to given problem sets. Rather design education is about developing a higher order creative capability in students that enables them to independently and collectively generate many design resolutions to all manner of unpredictably challenging and intentionally open-ended design propositions. The key, in determining whether or not a design response is as creative as it might be, is to start with and regularly return to questions of *'What if?'* and *'Why not?'* This strategy can and often is repeated either implicitly or explicitly until curiosity is reasonably well satisfied and the most desirable or creatively appropriate design outcome(s) can be practically realised in accordance with the available time, resources and criteria specified in the design brief. Judgement as to the overall short or long-term success of the design outcome is left largely up to the client, the end user and/or the professional field of established design practitioners to determine. Where such design output transcends the immediacy of everyday 'small c' creative purposes or the social context of the original designer, and magnifies in influence to successfully survive as a 'big C' cultural determinant beyond its original application or timeframe, then both creativity and design enter into the meme dimension.

Because human involvement in creativity is iterative and interactive, the processes by which creative outcomes are achieved are both observable and repeatable experiences. Therefore creative strategies are teachable, provided the key motivational circumstances and especially the enabling attitudes and communal learning contexts are satisfactorily articulated, fully embodied and enacted by both teachers and learners. Holistic embodiment in creative design and design education practices, coupled with the wonder

and drive of perplexity, reflection and collaboration, have the potential to trigger deep learning and, depending on the field of application, initiate participants into overlapping communities of design, education and design education practice. Through the tradition of studio based practice novice designers and design educators learn how to explore possibilities, whilst progressively developing artistry and creative self-determination, along the path to becoming expert practitioners. Discussing creativity and innovation in relation to teaching, Grundin (1990) argues:

> Creativity cannot be divided into species or expressed in axioms. Rather it is an attunement of energies and attitudes whose roots lie deep within the individual and whose principles cannot be conveyed in symbols. Yet it is possible that a good teacher, by synthesizing the shock of discovery in a student, can foster that attunement. Good teaching develops students' creative abilities by unlocking their sense of wonder. Students learn creativity not directly from the teacher but from the cathartic self-revelation that the teacher inspires. (Grundin 1990, p. 154)

The Operational Model of Creative Questioning, based as it is on the two open-ended questions *'What if?'* and *'Why not?'*, is a rhetorical device that merely helps to make creative attitudes explicit. Once explicit creative attitudes become available for intentional application in a wide range of teaching and learning contexts in schools, vocational training and higher education, as well as in workplace or home environments. Therefore this model, and the theoretical principles that underpin it, can be tactically deployed, individually or collaboratively, at any stage in the design and design education processes. The model demonstrates 'how' a creative perspective can be introduced into learning at precisely those moments of perplexity when no immediate way forward seems apparent. Therefore, creativity can be afforded some degree of overt pedagogical priority in teaching by drawing on a heuristic device such as this to demystify creative attitudes, making them more identifiable and attainable for the novice designer and design educator. As a theoretical and practical tool, this model distils in simple graphic format and language, many well-known practical principles currently in tacit use in design practice. Simple *'What if?'* and *'Why not?'* questioning is readily available for application in design practice, education practice and design education practice as a way of conscientiously stimulating creative engagement and engendering a deep and reflective learning approach whenever required.

The goal of targeting creativity in design education, as described throughout this inquiry and encapsulated in the model, is to eschew the futile quest for single answer solutions or predictable certainties in favour of actively envisaging and seeking out alternative, multiple, future-oriented potentialities. Creative options may then be subject to disciplined critique, critical analysis, cycles of reflection and practical judgement as part of an ongoing process of refinement and 'in-use' design implementation. Such a pedagogical approach privileges multiplicity, ambiguity and 'managed uncertainty'. It also readily tolerates interim difficulty or even 'failure' at the concrete and conceptual levels, because the perplexity that accompanies such temporary setbacks offer challenges that provide an extremely useful basis for reflection and analytical review informed by experience. Using the *'What if?'* and *'Why not?'* scenarios encourages different sorts of explorative, discovery-related attitudes, motivations and actions, viewed not as ends in themselves but rather as stimulating and rewarding life experiences awaiting both teachers and learners. Such a creative approach to teaching and learning applies to almost any area of content in terms of design specialisation, and is more broadly relevant in many other fields in education, because it targets the intentional implementation of creativity as a holistic and embodied higher order human capability.

In this chapter the respective theoretical perspectives of Schon, Wenger and Ramsden on reflective practice, teaching in relation to communities of practice, and surface and deep learning are triangulated in support of creative attitude development. This substantiates the rhetorical relevance and inventive cogency of the Operational Model of Creative Questioning. The generative value of rhetorically asking *'What if?'* and *'Why not?'* questions is argued in relation to Russell's commentary on the pedagogical merits of perplexity as a future oriented strategy for intentionally engendering creative attitudes in design education. This discussion also reflects increasing academic interest in theoretical implications drawn from discussion of the New Rhetoric, which helps explain the pedagogical role and relevance of creativity in design education. In so doing this chapter has explicated how creativity is made teachable in design education. The next and final chapter summarises the discussion of creativity as a higher order capability in light of persistent calls for innovation in teaching and teacher education, especially in design and technology. ……………………….

Chapter 8:

<u>CONCLUSION</u>

The inquiry into Creativity: A Higher Order Capability has examined 'how' creativity is made teachable in design education. It is an interdisciplinary study into a potential pedagogy of creativity where design education is situated at a nexus between the professional and academic domains of Design and Education.

The investigation covers the professional interests of three interrelated communities of practice. These include communities of design practice, education practice and the hybrid arena of design education practice. Practitioners with a commitment to enhancing creativity in design through education include designers working in industry, teachers working in schools and design educators working in vocational colleges, universities and other higher education institutions. Learners include secondary students exploring design and technology at school, tertiary students studying for a career in a specialist field of design, as well as teacher education students at university learning how to become qualified professional teachers across various design related disciplines and technologies. In addition, lifelong learning includes professional development of design practitioners looking to continually enhance their own creative performance and those design practitioners recruited into parallel roles as design mentors, trainers, tutors, teachers and lecturers working in industry, community colleges or tertiary education institutions.

Within the design domain there are numerous disciplinary fields including fashion, interior, graphic, digital, industrial, exhibition, furniture, textile, jewellery and landscape design to name some of the many design specialisations. To this can be added architecture, multimedia, film and television and communication design. In all these, and many other, disciplinary applications different technologies, materials and content knowledge, technical expertise and practical skills vary widely. This enables critical design contributions at every level, in every phase of virtually all avenues of human endeavour. Higher level creative capability underpins all considered design activity

including design education. Yet pedagogical appreciation of how creativity operates in the world needs explicit clarification if teachers are to knowingly guide design students to reach their full creative potential. This also has implications for teachers seeking to stimulate creativity in domains outside design.

As a research topic, past investigations into the nature, roles and theories of creativity have proven informative but insufficient in explaining how or why human creativity operates as it does in the world, especially in relation to education. In the foregoing chapters, creativity is shown to involve very much more than mere procedure, or abstract technical or theoretical skills, or indeed the extraordinary intellectual ability to think up novel ideas once attributed to some mysterious and innate talent or dispassionate mental gift signifying 'genius'. Rather, this inquiry into creativity as a higher order capability confirms that creativity exists as a potentiality in everyone, while acknowledging that some people learn how to capitalise on their creative capability more readily than others do. The educational challenge addressed in this investigation has been to reflect upon implicit understandings of practice-based design traditions in order to explicate the critical pedagogical considerations underpinning successful teaching for creativity in design education. It also describes actionable ways in which creative learning can be overtly facilitated in education so that more people may develop confidence in marshalling and applying their creative abilities in all aspects of life. Increasingly creativity is characterised as a survival instinct. As an observable holistic attribute, creativity is well known to be intriguingly complex, multifactorial, deeply human, fully embodied and communally shared. Creative propensity represents a highly contingent and adaptive means by which people in all walks of life respond differently, as particular situations require, to the specificity of multiple challenges, shifting contexts and the technological demands of evolving disciplinary applications in design and other domains.

No one frame of reference satisfactorily accounts for how individuals and groups of people regularly generate new and alternate strategies for living and working in an uncertain world. No coherent pedagogical explanation has previously been offered as to how such creative ability can be pragmatically stimulated, professionally cultivated and sustained in creative disciplines such as design. Therefore an interdisciplinary research

approach has been employed in this inquiry that draws evidence together from a very wide range of sources. A growing consensus amongst creativity researchers suggests that a 'confluence' of theoretical views on, and composite insights into, creativity is likely to be the only productive way forward. Correlation of theoretical evidence affirms that creativity is indeed a profound phenomenon that depends on practitioners, teachers and learners expanding their self-concept and worldview beyond that typically offered in traditional education. A creative perspective is qualitatively rich in underpinning values, attitudes and beliefs that focus on personal and collective creative potentiality, concentrating attention on 'what might be possible' rather than being educationally preoccupied with only confirming 'what is'. Understanding what this means professionally and pedagogically, and examining how creativity can be targeted in design education, is analysed from various perspectives in preceding chapters.

The motivation, structure and purpose of the inquiry into creativity as a higher order capability are introduced in Chapter 1. This examines the key research question of how creativity is made teachable in design education in light of postmodern reflection on the quest for 'monstrous knowledge' (Hodge, 1998). This acknowledges the qualitative challenges associated with interdisciplinary research. Research design and methodology are outlined in Chapter 2. This substantiates the need to better understand 'how' creativity is made teachable in design education. Here reference is made to original data obtained from a survey of members of the Design Institute of Australia verifying the professional relevance of key aspects of creativity for design teaching and learning. A full survey report is included as Appendix 1. Various literatures pertinent to exploration of the higher order nature of creative capability are also reviewed in Chapter 2 to provide a breadth of insight from different academic and other perspectives into how creativity is made teachable in design education.

Context for understanding the professional design domain is established in Chapter 3. This chapter canvasses many views on what constitutes and distinguishes professional design practice from parallel considerations in art, craft, science, innovation and creativity. Evolutionary development of the specialist field of design education in England, the United States of America and Australia throughout the twentieth century is

then presented in Chapter 4. An Iterative Model of Professional Design Education, included as Appendix 2, supports a contemporary appreciation of the relative educational priorities in design education in Australia across different sectors over recent decades leading up to the present. This model locates creative capability in relation to design competencies and design practice aligned to the Australian Qualifications Framework (AQF) that governs educational criteria, levels of achievement and qualifications offered in school, vocational and higher education courses. A particular concern in this chapter is establishing why creativity is considered so important in design education while commenting on how well creativity has been accommodated in prominent educational theories, such as experiential and problem-based learning, used in the past to validate traditional design education practices, especially in higher education.

Understanding creativity is covered in Chapter 5. This compares different ways of examining the topic of creativity as a higher order capability. The futility of Cartesian inspired separation of cognitive from affective considerations in education is confirmed by recent neurological findings. This and other interpretive philosophical research unequivocally affirms the inseparability of emotional and psychological wellbeing from mental and physical engagement and practical action if learners are to achieve healthy and balanced intellectual, attitudinal and motivational development. The affective impact of future oriented attitudes and emotions on enacted creativity, practical judgement and performance in design, as in other professional disciplines, is noted in relation to the inadequacy of traditional educational practices that privilege intellectual development to the detriment of other learning capacities. In the process past conceptual preoccupation with the creative ability of individuals is expanded to make provision for a more holistic re-conceptualisation of creativity as a 'meme' that encompasses broader communal and cultural relevance.

Divergent theoretical sources in creativity research, philosophy and education are cross-referenced in Chapter 6. This presents an experientially oriented intersection of phenomenological, pragmatic and educational philosophies deemed particularly relevant to building better understanding of how creativity and professional expertise is holistically developed in design education. Issues of praxis and action; social relevance,

subjectivity and intersubjectivity; human agency and what it means to 'be creative' in terms of the fully sensate embodiment of creative action and practical reasoning contribute some challenging yet very significant insights into an incipient pedagogy of creativity. This philosophical positioning links holistic deep learning with qualitatively embodied life experience, meaning making, identity formation, community and professional practice. It informs culminating arguments offered in Chapter 7 that substantiate the theoretical cogency of the Operational Model of Creative Questioning as a heuristic for intentionally targeting creative teaching and learning in design. This model was first introduced in Chapter 2 and is explicated in relation to selected rhetorical considerations in Chapter 7 in conjunction with the triangulation of prominent educational theories on reflective practice, communities of practice and surface and deep learning.

Together this breadth of analysis emphasises the importance of concurrently dealing with creativity in both narrow and broad community terms by attending to the creative development of individuals and groups of learners in the context of the wider social responsibilities and cultural implications of designers. It is argued that rhetorical *'What if?'* and *'Why not?'* scenarios indicate how creativity is made teachable in design education by stimulating engagement with a means of generating multiple possibilities in response to open ended design briefs. Awareness of the positive role of perplexity is especially important because this has the potential to peak interest and encourage a depth of understanding that flows from belief in, and ownership of, the creative experience by both teachers and learners. It is asserted that creative achievement and satisfaction relies on overtly developing a shared commitment and the holistic participation of teachers and students in collaborative and productive (rather than reproductive) learning relationships. This in turn is shown to have ongoing ramifications for understanding the dynamic nature, conduct and interaction of the professional practice of designers, teachers and design educators within and between the overlapping communities of design, education and especially design education.

The primary relevance of this inquiry into creativity as a higher order capability lies in its timely contribution to the innovation debate in Australia. By focusing on how creativity is

made teachable in design education, specific insights are made available for potentially improving pedagogical understanding of creativity in teacher education and thereby helping to expand creative confidence and performance in schools. Similarly appreciation of a more holistic pedagogical understanding of creativity is potentially useful for the professional development of teachers of design and other disciplines in vocational education and training and higher education. As noted in Chapter 2, the Australian Government's commitment to innovation since 2000, outlined in 'Backing Australia's Ability', led the Committee for the Review of Teaching and Teacher Education (2003) to call for immediate action to stimulate growth of creative human and social capital arguing:

> Social and economic progress in Australia, and the strength and vibrancy of our democracy, will increasingly depend on a well-informed and active citizenry with the capacity to solve problems, to create, and to generate new and better ways of doing things… At all levels, our society will require creative individuals able to communicate well, think originally and critically, adapt to change, work cooperatively, remain motivated when faced with difficult circumstances, who connect with both people and ideas and are capable of finding solutions to problems as they occur – in short, individuals with the array of skills constituting a well-developed capacity for innovation… Schools and teachers are pivotal to the development of the knowledge and competencies of individuals, …and the shared norms, values and understandings that underpin cooperative endeavour in broader society… Countries that are progressive and successful will increasingly have education systems that develop human and social capital to the fullest possible extent and consistently produce knowledgeable young people with advanced capacities for innovation. (Committee for the Review of Teaching and Teacher Education 2003, pp. 5-6)

At policy level the goal is '… firstly to establish a culture of innovation in all Australian schools; and secondly to develop a capacity and predisposition for innovation in all Australian students'. Teachers are coming under increasing pressure to 'adopt creative approaches' and 'take calculated risks within agreed frameworks'. But how is this possible without first establishing an explicit pedagogical appreciation of what is involved in actively teaching for creativity?

At the 3rd Biennial International Conference on Technology Education Research, Steve Keirl (2004, pp. 80-90) from the University of South Australia drew attention to serious underlying tensions between government policies calling for improved innovation in schools and the critical demands of teaching for creativity. In highly prescriptive curriculum and competency environments, that he suggests 'dehumanise' and 'depersonalise' education, Keirl argues the inherent contradiction of specifying definitive outcomes in design and technology learning whilst concurrently calling for increased

creativity, innovation and entrepreneurial activity in schools. Fundamentally he questions that, 'Given current pressures on the profession how much creative risk for the students is healthy for the teacher? How does Design and Technology (in schools) manage, promote and harness creativity?' In the process he reflects on the merit of 'anarchic thinking … in generating student suspicion of singular design / thinking / creativity models / processes / recipes – often used as crutches never to be discarded'.

This is a salutatory caution with respect to advocating the Operational Model of Creative Questioning as an heuristic device for promoting creative teaching and learning practices. It is imperative that this indicative model is seen as nothing more than one example of how a 'creative approach' can be instigated in educational contexts. While the 'anarchic' principles underpinning the creative questioning of *'What if?'* and *'Why not?'* are valid, the model itself must not be afforded undue priority. In particular the model should not be dealt with out of heuristic context or applied instrumentally lest it also risks becoming another poorly understood technique or uncritical procedural 'crutch never to be discarded'.

The iterative and rhetorical nature of the model purposefully eschews any particular epistemological end-in-itself. Rather, the Operational Model of Creative Questioning seeks to focus pedagogical attention on the ontological and reflective nature of holistic 'creative action', as opposed to cognitive preoccupation with 'creative thinking' in isolation. By combining theory with practice, the generic model constitutes nothing more than a potentially useful pedagogical strategy. Viewed as an optional aid to action the Operational Model of Creative Questioning explicates a contingent method of practice, or illustrative means-to-an-end, which more often than not can help to target creative abilities, stimulate perplexity and encourage practical creative engagement with the design or other task in hand.

To develop genuine understanding of 'how' creativity is successfully made teachable in design education, it is vital that educators of teachers, trainee teachers, and others with pedagogical interest in design education, articulate the holistic higher order physical, emotional, psychological and intellectual capability needed by both teachers and learners

to 'enact' creativity in any given circumstance. This includes cultivating an acutely sensitive ontological appreciation of creativity as 'lived experience'. The experience of creativity must be engaged and fully embodied if it is to be accompanied by deep learning that achieves self-efficacy. Development of creative self-efficacy in design education accompanies participation in 'mastery experiences'. These are 'challenging activities that cultivate potentialities', where success requires perseverance, sustained effort and induction into specialist fields of design knowledge and skills by teachers that actively fulfil the professional requirements of creatively motivated role models (Bandura, 1994, pp. 71-81). In specialist design education this is known to occur most reliably in studio and practical workshop situations where traditional 'master/apprentice' relationships are established between teachers and learners. That participation in such design education situations can and does elicit creativity from teachers and engender creativity in students is tacitly accepted but has to date been poorly understood from a pedagogical perspective.

This inquiry into creativity as a higher order capability offers an explicit educational perspective that concentrates pedagogical attention onto how and why the development of shared values, attitudes and beliefs about holistic embodied creativity in design practice and design education are essential. A creative design practitioner or educator must be convinced of one's own and other people's potential to 'be creative'. They must remain 'mindful' of the future orientation of creativity and value the cultivation of this potentiality above nostalgic preoccupation with outmoded art, craft or scientific practices. All the while design educators should reject or modify otherwise unhelpful educational traditions, especially those steeped in cognitivism and deficient in strategies that overtly facilitate deep and emotionally rewarding affective learning.

To engender a higher order of enacted creative capability in students in any purposeful way, teachers of design must be prepared to relinquish absolute control over the learning situation. They must afford students genuine scope for experimentation including autonomous decision making and the chance to make and learn from individual and shared mistakes. Committed creative mentors will guard against being overly judgmental when reviewing and advising on students' works in progress, conscientiously refraining from personal denigration or unnecessary negativity during critical appraisal. Teachers

should moderate over reliance on questionable dictums, practices or habits of working. Most importantly they must offer students qualitatively more in the way of meaningful and enriching creative experiences than the atomisation of skills as technicist procedures or the regurgitation of uncritical pre-existing knowledge devoid of real understanding that some assume must be delivered in the name of competency development and assessment.

Those who would be creative must willingly seek out challenges, knowingly adopt and actively employ 'productive' attitudes and actions in the generation of new or improved knowledge and skills. A creative approach to teaching and learning must be ever vigilant, avoiding complacency, with the attendant threat of becoming routinised, stale or irrelevant, by constantly reviewing, revising and refreshing the educational life experiences shared by students and teachers. To remain relevant and effective, a creative approach in design education must inevitably be customised to satisfy differing needs in each and every application, which stimulates the interests and motivation of both students and teachers. To explore creative potentiality in any field, individuals must be able to set old certainties to one side and risk venturing out into unknown territory. Accompanying this is the realisation that mastery of personal 'small c' creativity is an essential precursor to generating shared 'big C' creativity in any domain. It is also worth remembering that human creativity always carries with it the opportunity to positively influence or change social interaction and, under some circumstances, to substantially shape cultural heritage for future generations.

The exercise of individual creativity requires physical, mental and psychological courage. Creativity turns on the confidence and the conviction to be and do things differently. To engender creative confidence in students teachers must learn how to lead others by example. This means knowingly rejecting the personal safety and professional security of the 'spectator' position of an instructor in favour of adopting the 'stance' of an active and committed participant who convincingly models all aspects of the creative experience through 'artistry' in one or more disciplinary design fields. This pedagogical approach includes immersion in the specificity of the design challenges at hand, impromptu demonstration and experimentation along with considered exploration and judicious risk taking by the teacher amid the 'hot action' of classroom or studio interaction. It requires

anticipation and acceptance of the unexpected, and recovery from mishaps or total failures with undiminished enthusiasm and creative confidence.

To earn the trust and respect of learners, and fulfil the responsibilities of a design coach or learning guide, creative teachers must willingly join with students in exploring unfamiliar interdisciplinary territories, trying new approaches and generating multiple possibilities. Creative teachers will accept that each learner is an individual striving toward their personal best when working alone and also when working collaboratively with others. Finally a creative teacher has faith that appropriate and relevant design resolutions will ultimately emerge, precisely because the potentiality of suitable creative outcomes can be envisaged, actively sought out and conscientiously brought to fruition as conceptual alternatives, tangible challenges and practical revisions to the status quo.

Therefore a pedagogy of creativity in design education is explicable and attainable provided there is a focus on building self-efficacy through whole-of-person teaching and learning. This must be informed by appreciation of what it 'feels like' to intentionally 'be creative' in the specialist disciplines within the co-joined domains of design practice and design education. Such a pedagogical position is open ended and acknowledges the underpinning social and community relevance of personal and collective design activity. Creativity is made teachable in design education in two basic ways. Firstly by creating a safe and conducive pedagogic 'space' where individual and collaborative creativity is invited to emerge and permitted to flourish. Secondly, by promoting creative confidence, belief in oneself and a healthy respect for the creative potential of others, integrated mental, emotional and physical abilities of a higher order can be actively cultivated. Higher order creative capability is contingent, adaptive, deeply felt, fully embodied, holistically sensate and deeply engaged in designing the future. Creativity is best understood as tantalisingly rich and rewarding life experiences open to design practitioners, design teachers and learners of design alike, along with anyone else with confidence in making a personal contribution to living life creatively in any field.

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Appendix 1: <u>PRACTITIONER SURVEY</u>

**KEY ASPECTS OF CREATIVITY
FOR TEACHING AND LEARNING IN DESIGN EDUCATION**

Overview of practitioner survey:

Creativity is a very broad research topic. As part of the interpretive research methodology used to inquire into 'Creativity: A Higher Order Capability', a qualitative survey of members of the Design Institute of Australia (DIA) and their professional associates was conducted. This survey indicates the nature of certain implicit and explicit pre-understandings about creativity circulating within the community of Australian design practitioners. Personal views on what Australian practitioners perceive to be key aspects of creativity for teaching and learning in design education were canvassed using an anonymous questionnaire. The qualitative data obtained broadly concurs with much anecdotal and theoretical information to be found in the design literature and elsewhere. The data are also consistent with the researcher's own largely tacit understanding of creativity at the outset of the investigation.

A qualitative survey instrument, titled 'Key Aspects of Creativity for Teaching and Learning in Design Education', was developed and ethically approved for email distribution and anonymous hard copy return by post, via the University of Technology Sydney Faculty of Education. The questionnaire consists of twenty questions in four sections A – D. The survey of design practitioners was distributed nationally online through the Design Institute of Australia (DIA) email network. An invitation was included with the survey guidelines for designers to forward the questionnaire onto other professional design colleagues for completion and return where such forwarding of material was deemed appropriate. A total of forty-eight responses were received with in-depth written answers. When the survey was distributed over the DIA email network there were approximately 294 listed members. It was hoped that 15% of email recipients or 44 design practitioners would respond. Written responses to the survey were received from 48 professional designers, most being DIA members. Therefore approximately 16.1% of those surveyed responded, constituting a reasonably indicative sample of the qualitative views of professional designers on the nature and importance of creativity in design education in Australia. A copy of the questionnaire is attached at the end of Appendix 1.

Executive summary of survey findings

In brief, **Section A** contains ten relatively closed questions with limited space provided for optional comments. This first bank of questions sought contextual information about the respondent's job title, size of enterprise and nature of design practice, briefly describing type of workplace, clients and projects undertaken. Primary discipline-specific areas of professional interest and expertise were also canvassed in relation to design, art and teaching. Respondents then indicated the number of years in decades they had been

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involved in professional design and/or teaching practice, noting the highest level of qualification they had personally achieved.

Section A concluded by asking respondents to rate the importance of creativity in design education on a 1 – 5 scale from 'essential' to 'not important' respectively. They were then asked to indicate how good they believed their own understanding of creativity to be in their main field of expertise. Ten options were provided from which respondents could nominate one or more common characterisations of creativity expressed in familiar language labelling one of the ten options 'other' giving space where the respondent could write in their own suggestion if preferred. Designers were asked to indicate if they felt creativity operated the same or differently in various design fields and how frequently they personally discussed creativity with colleagues. Question 10 provided space for explanation after indicating what had been most significant in shaping or changing the respondent's views about the nature and importance of creativity in relation to their teachers, employers, colleagues, peers or other factors.

Key findings of Section A: The majority of respondents were experienced professionals of more than ten years working in positions of responsibility as senior designers, design directors or owner/operators of design practices that employed other designers. A reasonable number had also taught, currently lectured part time or were employed full time coordinating specialist design education programs at a tertiary level. A good range of design disciplines was represented with a slight dominance of interior designers which reflects the DIA constituency. Agreement was virtually unanimous that stimulating creativity in students studying in design education courses was "essential" or "critically important" with the vast majority stating that they personally believe they "definitely" have a good understanding of what constitutes creativity in their own design discipline.

Section B consists of six inductive short answer questions seeking interpretive responses with reasonable space provided for written comment. Respondents were first asked to briefly describe the creative activities or work practices they use to generate design ideas, then to comment relatively on what part they considered 'knowledge', 'skills' or 'attitudes' play in creativity. They were asked to indicate what 'beliefs' or other factors they thought inhibit or promote creativity. Respondents were invited to specify what 'professional strategies' they employ to purposefully increase or enhance creative design outcomes in their own design field or workplace. The last question in Section B asked for an educational opinion in two parts. Focusing first on what implicit or explicit 'creative teaching strategies' might help to overtly improve creative results and student outcomes in the classroom, practitioners were then asked to consider whether or not they felt that such strategies could be applied in terms of course structure, curriculum content, training package development or teacher training.

Key findings of Section B: This bank of questions aroused considerable interest from respondents who willingly shared their personal views in copious written comments. Most agreed that appropriate knowledge, skills and attitudes were all necessary in professional design practice. However a significant number asserted that positive, 'open minded' and creatively oriented attitudes to the work of design, to themselves as practitioners, to their colleagues as professionals and most importantly to fulfilling client

needs were vital for design outcomes to be considered relevant and creative. Yet many respondents qualified their answers suggesting that such 'creative' attitudes are very difficult to specify satisfactorily, especially in relation to adopting non-conservative strategies that involve calculated risk taking in design practice. Generally it was agreed that a 'fear of failure' represented the most significant inhibitor to creativity and a belief in one's self and that 'anything is possible' are the greatest boon to creative confidence and productivity. Many respondents struggled in responding to the educational question. Some people noticeably balked, choosing to leave the last question in this section blank. This has been taken to indicate that most practising designers intuitively understand what is creatively required of them in completing their own design work. However they seemed much less confident of how such creative self-awareness might be translated into the classroom and utilised professionally in an educational environment at a structural level.

Section C involves three reflective short answer questions with space for comment. These questions queried what significant personal or professional experience and what particular practitioners, authors, theories or texts influenced respondents' views about creativity. Then opinion and explanation was sought as to whether or not they felt creativity could be improved by astute and better-informed 'creative teaching strategies'.

Key findings in Section C: Answers in this section were generous, extremely rich and varied. Travel was cited as one of the most influential experiences impacting on the creative self awareness of individual respondents due to exposure to other cultures and the work and ideas of other practitioners in their field of expertise at a time when they were relaxed, receptive and open to new experiences. A few respondents name figures prominent in design history and other prominent contemporary designers as having had a significant impact in shaping their personal design vision and views about creativity. Edward de Bono was the only author to be named regarding creativity theory. Most notably, survey respondents made no explicit mention and did not draw any direct or indirect inferences from more than half a century of very extensive and detailed cognitive psychology research on the topic of creativity. Nor was there any mention of formal philosophical perspectives. Amongst many shared individual beliefs, and strongly declared personal convictions, about the nature and relevance of creativity a fair degree of ambivalence was evident concerning the potential improvement of creativity in response to better-informed teaching strategies. Some mature designers and number of respondents with experience as educators supported this notion in principle, while other practitioners selected 'possibly, I'm not sure' as their answer with various explanations. Others chose to leave the entire question blank.

Section D finally invites observations, comments or recommendations to enhance the professional relevance of the present research into creativity as a higher order capability.

Key findings in Section D: A majority of people took the opportunity to offer further considered reflection on various design and design education related issues of importance to them, without necessarily maintaining a focus on creativity. Over one third of respondents left this area of the questionnaire blank.

Interpretation of survey data

Qualitative information obtained from the practitioner survey substantiates the premise that, while many professional designers may use common language and share certain well-established strategies and assumptions about creativity with colleagues, by and large their understanding of creativity is held tacitly with little if any explicit theoretical underpinning. This suggests that the implicit views of practising designers about creativity and its relevance in design education go largely unquestioned and do not necessary extend to include informed pedagogical insights into the potential for 'creative teaching' in design.

By implication it seems reasonable to conclude that professional design practitioners, recruited as part time teachers and even full time design lecturers, may be strong on technical skill, contextual design knowledge and industry experience. However they are very likely to be weak in developing teaching strategies that knowingly engender creativity in students. Instead common practice in design education has been to adopt a didactic master-and-apprentice approach to teaching and hope that creativity evolves as a consequence of the 'show and tell' methodology. Practical skills-based exercises are reproduced, design processes are followed, studio production procedures are simulated and designer behaviours are mimicked. Generally this reflects tasks and activities that teachers have either found creatively formative when they were students or specific learned behaviours they have found productive when working collaboratively as professional designers in industry.

The survey data from design practitioners confirm that such practices focus on developing a keen sense of visual observation and interpretation, interpersonal sensitivity and robust verbal and non-verbal communication skills. These skills are needed to solicit information, participate in group discussions and exercise good individual listening skills. There is evidence of a commitment to expansive targeted and tangential visual and contextual design research that may or may not have a theoretical basis. This is balanced against diligent project planning and attention to terms of reference specified in design briefs that define client needs and wants in terms of deliverables against budget and time constraints. Collaborative engagement with design challenges and professional peers is seen as important and problem solving is addressed using various enacted ideational development strategies. High priority is afforded authentic industry experience for learners involving exposure to input from professional design practitioners plus work placements or internships where students go into the workplace to learn about 'real world' design practice.

Specific creative thinking strategies identified in the data include brainstorming and mind mapping, de Bono's lateral thinking and 'Six Thinking Hats' techniques, a 'proprietorial process' called the 'innovation spiral'; as well as 'black box method' tracking schematic decision making or expansive 'thinking outside the square'. Bauhaus dictums and other modernist design principles such as 'form follows function' are noted along with a delight in serendipity or 'chance' and a respect for the subliminal or subconscious resolution of design problems, which are then consciously built upon, tested and refined until it 'feels right'. Mistakes or mishaps were equated with 'new inspiration' described by one

respondent as a, '… process of discovering the nature of the problem and being open to the possibilities that fall out of that awareness'. This reference to openness and other similar comments about 'freedom' indicate a particular respect for creative opportunism, the willingness to explore and take carefully considered conceptual risks in creative design practice. This demonstrates a positive 'can do' attitude that emerges as a common theme in the data, described as a valuable design attribute unrelated to discipline specific knowledge and specialist skill components of expertise in different design fields.

Generally, within the design profession, it is taken for granted that there is very substantial efficacy in the traditional 'learning-by-doing' approach to design education. However when provided with an opportunity to elaborate, the majority of designers and a significant number of design educators surveyed seemed hard pressed to say why or how this teaching approach works (or not) in stimulating student creativity. This suggests that design educators, especially those new to the professional role of a teacher, may have some difficulty explaining or justifying the creative side of design to students in the classroom. Instead, design teachers often default to modelling the felt experience of designing in the hope that learners will empathise and eventually come to share a tacit appreciation of what it feels like to be creative. This involves teachers demonstrating and students practising hand and concept development skills, while working through visual techniques and mental and practical processes for generating multiple interim outcomes to carefully predetermined design tasks. Then iterative procedures are enacted by which the many possible design solutions are initiated, judged, critiqued, synthesised and refined into the best tangible response to the design challenge within given time and resource specifications. Most respondents attribute the success of this approach to keeping an 'open mind'.

The outcome of this practitioner survey therefore substantiates that there is far more than just knowledge, skills and procedural 'thinking' involved in exercising creativity within design. Hence, if a pedagogical interpretation is to be developed explaining how creativity is made teachable in design education, there is a need to supplement data from this survey with insights drawn from further research and other sources that target the experiential side of teaching and learning to design.

Survey methodology

A questionnaire format has been implemented to conduct this practitioner survey into 'Key Aspects of Creativity for Teaching and Learning in Design Education'. Merriam and Simpson (1995, pp. 70-71) suggest that questionnaires represent one of the most easily administered and widely used data collection methods for interpretive research. This is because written surveys provide a cost effective and reliable mechanism, ' … for careful construction and validation of questions in advance of conducting the study'. The merit of the exploratory survey method for this research into creativity lies in its avoidance of contrived or manipulative experimental procedures. Questionnaires are reasonably succinct and manageable to implement and therefore ideal as a mechanism for verifying assumptions about creativity circulating in the professional design community. In general questionnaires help collect qualitatively rich first-hand descriptions of 'what is' from respondents. As such the prepared for this research surveys practitioner views about

creativity in relation to design practice and education in Australia. These methodological benefits of survey questionnaires are offset against relatively poor predictive power and a tendency toward overly expansive narrative that can introduce unanticipated variables into the data analysis. Therefore, as a discipline in developing this research instrument, a carefully considered mix of closed, 'forced choice' and short answer open questions have been employed to assist in maintaining a reasonably close focus of responses on the related themes of creativity in design education being investigated.

The purpose of conducting this survey was to solicit evidence of implicit and explicit presuppositions, concerning the nature and relevance of creativity in design education, from practising designers in Australia. The Design Institute of Australia (DIA) is the peak professional body with a national profile across multiple design disciplines. DIA has a declared interest in design education and when appropriate lends its support to various research projects. As a DIA member, this researcher sought and obtained DIA co-operation in the distribution a qualitative survey to the DIA membership via the email network. To maintain ethical standards and ensure anonymity, responses were not returned electronically to the researcher but rather written responses were forwarded in hard copy by postal return via the UTS Faculty of Education academic supervising this research.

Qualitative analysis of the questionnaire returns involved carefully reading the written responses to each question. Answers to each of twenty questions and subset queries on forty eight returns were subsequently correlated and interpreted to identify common themes and shared assumptions. The information from each question has been summarised in descriptive format with a cross section of responses recorded in this report as examples. Participant feedback involved one or more selected options and short written comments to ten contextual questions, six interpretive questions and three reflective questions. Passing note has been taken of intermittent observations, comments or recommendations volunteered by some respondents to the optional final question. It is important to note that when designing the twenty item questionnaire single answer responses to closed questions were kept to a minimum. Rather, respondents were encouraged to nominate multiple options and/or contribute personal views in writing to a significant number of questions. Thus the nature of the data obtained is rich and varied in format rending any attempt at a numerical tally meaningless. Therefore formal statistical analysis of the data has been deemed qualitatively inappropriate. Instead, gross support is noted as a proportion of returns merely to indicate majority opinion and the distribution of alternate views are identified where this adds information to the interpretation.

Detailed analysis of survey responses to each question

SECTION A: <u>CONTEXTUAL INFORMATION</u>

Question 1a: *Job Title/Role*

Amongst design practitioners job titles and roles vary considerably:

- Over half of the survey respondents are employed at an executive or senior level of responsibility in industry as managing directors, directors, managers, principal or senior designers or heads of design departments in industry or education
- Almost one third of respondents are full time design educators who maintain some level of design practice and other professional involvement. Also a significant number of practising designers work part time as design teachers and lecturers intermittently throughout their careers. This brings the overall participation rate of survey respondents in design education to just short of three quarters of the sample
- Over one fifth of designers responding to the survey are active in multidisciplinary design practices
- One eighth of respondents describe their role as design consultants.

Question 1b: *Briefly describe size and nature of design practice.*

The size and nature of design practices represented in the survey are also extremely varied. Survey responses were received from:

- Sole traders working as self employed designers, design consultants, contract and freelance designers, full and part time design lecturers
- Small, often specialised, design practices employing between 3 and 16 designers, some with permanent support staff and flexible numbers of casual design contractors
- Medium sized firms ranging from 20 to 40 people working in various design related capacities, often combining different design disciplines and services
- Large multidisciplinary design companies located in more than one region or capital city of Australia with up to 75 staff members working on local, national and international projects
- One in-house design and development division of a government authority services 50,000 households and employs 400 design practitioners and support staff delivering full service design, construction and contract management on a wide rage of internal and external projects
- Design education responses were received from individual teachers and private and public vocational and higher design program directors with student numbers including 300, 340, 350 and 400 learners in differing disciplinary design programs, institutions and locations.

Question 1c: *Briefly explain type of workplace, clients and projects undertaken.*

Workplace arrangements vary from private practices run out of designers' residences to small, medium and large commercial office and studio facilities, to purpose built design and manufacture premises or sizeable design departments in a government authority and tertiary educational institutions.

The nature, range and budgets of design projects undertaken by individual survey respondents proved remarkably diverse, especially given the finite number of forty eight responses received. The value of individual design projects ranges from hundreds to multi-millions of dollars. Activities include small domestic kitchen renovations up to international museum and airport architectural design. Scope of design involvement ranges from individual custom designed fashion or commissioned street furniture for example to large multifunctional commercial projects and high volume product design and manufacture of diagnostic electrical medical equipment selling between 100 and 1000 units. Designers responding to the survey are working across very different industry sectors servicing the design needs of private individuals or companies, public instrumentalities, retail and corporate clients. This includes architectural, interior and industrial design firms, multinational car manufacturers, electronic media, information, multimedia and telecommunication companies, printing, advertising and exhibition businesses to name some of the many professional applications of specialist design identified in survey responses.

One textile design business for example:

> … (works) closely with the main car makers on a tender system, best design at cost that meets other parameters wins (the tender). It is highly competitive and world best practice is a must. As a designer running the company I try to ensure design is not quashed by the pressures of manufacturing, as so often can happen. We have a clean state-of-the-art environment and a good mix of practical and creative (people). Our fabrics are in many Commodore lines, and we will be supplying 80% Camry fabrics this year (2002).

Question 2: *Please indicate <u>one or more</u> primary areas of professional interest/expertise/responsibility in relation to design, art or teaching.*

Most responses were received from self-identified design practitioners working in a cross section of professional design disciplines. A high proportion of respondents indicate multidisciplinary design involvement for a total participation rate of one hundred and thirty nominated disciplines from a total of forty eight responses. This means that most designers work in at least two or three fields of design concurrently, not including activities in art or education that were identified separately. Survey responses representing expertise by specialised fields of design include:

21	Interior Design
15	Graphic Design
13	Visual Communication
13	Architectural Design
11	Industrial Design
10	Product Design
10	Digital Design

8	Multimedia Design
6	Furniture Design
5	Engineering Design
5	Fashion Design
4	Textile Design
3	Film, TV, Video Design
3	Exhibition Design
2	Retail Design
1	Jewellery Design

In addition a number of respondents also nominated concurrent professional engagement in Art:

6	Fine Art
4	Applied Art & Craft
1	Media Arts
1	Photography

Respondents declaring involvement in the various sectors of design education include:

18	Vocational Education (public and private)
13	Higher Education
3	Community Colleges & Schools

It is clear from this data, collected via membership of DIA as the peak industry body, that there is a very significant pattern of overlap between the professional community of design practitioners and the professional community of design educators.

Question 3: *How many yeas of professional design and/or teaching experience do you have? Briefly describe scope of experience.*

The range of professional design experience of survey respondents is rather evenly distributed:
- Approximately 10% of respondents indicate more than 30 years experience as designers, culminating in business ownership or executive roles or senior academic positions, with high degrees of specialisation in some instances
- Roughly one third of respondents are located at the other end of the scale, having worked in industry for 1-10 years, they are in different stages of establishing their design reputation and professional career paths. A number in this group came to design after a career change and/or supplement junior, freelance or contracted design positions with part time teaching or tutoring in educational institutions
- Another one third are mid career designers have 10-20 years design and business or educational experience
- The remaining one third of mature practitioners declare 20-30 years experience and evidence a breadth of multidisciplinary design involvement in Australia and overseas.

Question 4: *What is the highest level of qualification you hold? State your qualification title(s) with specialisation (optional).*

Virtually equal numbers of respondents hold diploma and degree level qualifications. This means that there is equal representation of vocational and higher education trained design practitioners working in industry. Given the progressive evolution of educational credentials in design, in Australia over the latter half of the twentieth century, it is not surprising that a clear pattern emerges of an inverse relationship between experience and educational qualification. More experienced designers tend to hold lower level (but not necessarily less substantial) credentials. For example just short of half the respondents hold professional level vocational certificates or diplomas, one third hold university degrees and almost one fifth hold postgraduate qualifications up to Masters level. One of the most experienced designers, owning their own company and employing other designers, is self-taught.

Question 5: *On a priority scale 1-5, how would you rate the importance of stimulating creativity in students studying in design education courses?*
(1=ESSENTIAL – 5= NOT IMPORTANT)

All but one respondent deemed creativity an "essential" or "critically important" educational priority for design students. Therefore practitioner support for the critical importance of stimulating creativity in design education is unequivocal, in that nil dissent was registered in response to this question.

Question 6: *Do you believe you have a good understanding of what constitutes creativity in your field of expertise?*

Similarly, over 65% or the vast majority of respondents confidently declare that they believed they "definitely" have a good understanding of what constitutes creativity in their particular field of design. All but one of the other respondents believe they understand creativity "to a point". Interestingly, the final respondent is a recent graduate who answered "no, not really" to this question.

This result suggests that creative confidence increases with design experience and that some recent graduates of design education programs may not necessarily understand what constitutes creativity in relation to their chosen field of expertise.

Question 7: *In general terms, how would you tend to characterise creativity in your field of expertise?*

Practitioner responses to this question are particularly interesting in that most respondents nominated multiple characterisations of creativity and one quarter of respondents also wrote in their own definition of creativity. The creativity descriptors provided in the questionnaire reflect common assumptions about creativity and are listed below in the order of prominence attributed by respondents.

33	ORIGINALITY/INVENTIVENESS in new or unfamiliar contexts
24	PROBLEM SOLVING
24	INNOVATION/ADAPTATION within known or specified parameters
17	IDEATION using specified techniques (e.g. Brainstorming)
16	INDIVIDUAL EXPRESSION or personal statement
12	INNATE TALENT/GENIUS
10	STRATEGIC ENTREPRENEURSHIP/ORIGINAL RESEARCH
7	OPPORTUNISTIC NOVELTY/CLEVERNESS/DEVIOUSNESS
7	INTUITIVE/SMART/SHARP PRACTICE

Nine creativity descriptors were given. Respondents contributed another nine characterisations of creativity including:

- Ability to 'think beyond the square'
- Pushing the boundaries of the envelope
- A combination of the (given descriptors) using experience to look for new fields of use for known (applications) and development in new unfamiliar experimental fields
- Preparedness to take (calculated) risks
- Giving the client what they want within their parameters in the most practical, functional and inventive way
- Seeing things that aren't there (yet)
- Making connections
- (Creativity is/can be) all of the (given descriptors). In my opinion today's students in future will have to … be more adaptable to situations and (different) ways of working… to be advantaged.
- Things that make your heart sing!

This suggests that no single definition of creativity satisfactorily encompasses all the necessary enabling attributes that designers value. It also confirms that 'thinking' is only one consideration among many when it comes to implementing creativity in design contexts. Responses to this and other survey questions evidence the persistence of many remnant notions about the nature and locus of creativity accreted from older undeclared assumptions. For example support for the role of innate talent or genius or the subconscious in the operation of creativity still has a reasonable degree of currency amongst practitioners working within the design community.

Question 8: *Do you think that creativity operates in the same way or differently in various design disciplines? Please explain.*

Twice as many design practitioners assert that creativity operates the "same" in various design disciplines, arguing for example that:

… Design is fundamentally a creative response to a series of criteria or problems. Therefore creativity in design disciplines should be similar. Creativity for its own sake is art not design. The two are different and (are often) confused….

… Creativity is an attitude i.e. (asking) "why not?" instead of why?, how?, when?, where? etc …

… All creativity has its roots in freedom of thought…

… While content and context differs the attitude required to work creatively is shared…

An important finding from correlating this data is the suggestion that creativity is equated with inquisitive, open and free attitudes or an abiding 'passion' for designing.

A few respondents are "unsure". However, at approximately 5% each, equal numbers of respondents consider that creativity operates "differently" in various design disciplines or else "it depends" on other contingencies impacting differently on particular design fields. For instance respondents suggest:

> … (There are) possibly more constraints in some industries than others making creativity more 'difficult' i.e. hospital (design) has (more) rigorous functional requirements … compared with (designing) a piece of jewellery…

> … Some disciplines have definite problems to solve, others are open-ended, others have constraints (such as budgets, timeframes etc)…

> … Depends on the boundaries the design disciplines place on their own operatives…

> … Creativity depends on mediums/tools/materials that are to be used as well as the purpose or intended use of the products/systems/environment that is being designed…

Question 9: *Amongst your colleagues, how frequently discussed and enacted are views about creativity?*

Data suggest that creativity is a periodic topic of professional discussion amongst a majority of designers with a significant number of respondents suggesting that they "constantly/routinely" talk about creativity in relation to design practice. A minority of designers "rarely" discuss creativity. Most respondents would have previously agreed that creativity is "essential". Therefore it is reasonable to assume that the professional conversations of those who do not talk directly about creativity for its own sake do communicate regularly about creative design issues but do not necessarily regard this as a discussion of creativity per se.

Question 10: *What has been most significant in shaping or changing your views about the nature and importance of creativity? Please explain.*

Of teachers, employers, colleagues or other influential factors it is interesting to note that respondents rate education and employment as markedly less significant than the life experience of:
- personal observation of people in the world and the environment in which we all live
- exploratory research inside and outside their design specialisation
- working collaboratively with others in the field including clients and associates
- family encouragement and peer support for being creative
- travel and cultural enrichment.

Respondents were extremely generous with comments that emphasise how professional engagement with colleagues and peers, family and the world at large stimulates, guides

and enriches creative effort when applied to design. Most notably, many respondents reflect upon the broader implications of this question in terms of personal and professional development to suggest that:

> … Running parallel to the influence of the formal education process is self education through books, journals, magazines ….

> … In our organisation it is the need that drives creativity. We have to stay on top (or) ahead of the trend, even make the trend …

> … Creativity is being prepared to respond to one's own inner feeling about a situation regardless of how impossible the idea may seem to others. Unfortunately creativity is often more noticeable by its absence in designers… Sadly many design students haven't the faintest idea of why they are studying design and/or what their goals are. Creativity can only exist where a person is comfortable with change and is prepared to commit to being an instrument of change.

SECTION B: <u>INTERPRETIVE INFORMATION</u>

Question 11: *How would you generally describe the creative activities or work practices you use in your field to generate design ideas?*

Applied research emerged as an important contributor to the development of practical design ideas in response to a careful analysis of the expressed needs and underpinning wants of clients. Alongside such research and analysis is a commitment to 'cross pollination' by working collaboratively with others using techniques such as brainstorming or de Bono's principles of lateral thinking and 'Six Thinking Hats' to quickly generate pragmatic design material with which to work. Established design methodologies can then be applied to 'testing ideas within a group, involving the client in the process'. In this respect creative ideation in design is described as '… 99% hard work and 1% inspiration'. Discussion and visual interpretation are fundamental aspects of the creative communication process. Listening is considered an important skill coupled with a 'subliminal' receptivity, and openness of mind and 'positive attitudes' so that:

> … learning occurs within the group…

> … mistakes and mishaps become new inspiration…

> … (creativity is) a process of discovering the nature of the problem and being open to the possibilities that fall out of that problem…

Question 12: *Relatively speaking what part do you think KNOWLEDGE, SKILLS or ATTITUDES play in creativity?*

This is a key question in the survey. Knowledge, skills and attitudes are all seen by respondents as indispensable to creative design. While discipline specific design knowledge and mental and practical skills are fundamental to design practice it is generally agreed that creativity hinges on attitudinal development. For example respondents overwhelmingly suggest that:

> … A rich and deep knowledge base is a major reservoir from which creative responses can be shaped…

… Intuitive creativity is equally valid as 'thoughtful' or 'researched' responses … surely the more you know the more creative potential can exist… drawing on broader sources of information from which the creative process can come…

… Skills are relatively important in terms of being able to visualise or draw creative solutions for others to understand and interpret…

… Communication is essential. People skills (are) useful. (The) ability to listen and analyse is critical (as are) … practical skills … whatever you can use to translate incoming information into simple, understandable ideas…

… Skills are critical but only as a base, as a starting point. Unless skills can translate to something of a higher order, they remain mechanical…

… As skills improve and become second nature, the flow of creative output isn't stifled by other processes…

… Further skills are learnt and developed by being creative…

… (Attitudes are) vital – if you limit yourself in the mind… that in turn limits your (creative design) ability…

… Attitudes are formed by your upbringing, education and life experience, which will affect an individual's ability to be creative…

… Without an attitude conducive to increasing the probability of societal success as a whole, is counterproductive to the co-operative spirit. Wanting to make a constructive difference can build self confidence and esteem…

… Open mind, open heart, take it as far as you can but be prepared to take the knocks en route.

… A positive attitude is needed but also resilience when things don't go as planned. Flexibility is very important as it can be the making or breaking of the best design.

… The more one is open minded and willing to take risks the better!

… (Designers) must be open minded and positive, and not afraid to propose ideas other will shun…

… Attitudes can influence the 'dialect' of the idea/product language i.e. the amount of humour, wit, irony and sarcasm coded into the idea/concept/product…

… You must have the attitude that you can do it…

… (Attitudes are) paramount. A designer must be … a 'can do' and 'why not' person before all else…

… Attitudes are essential – open minded, curious, unorthodox…

… Attitudes are probably the most important quality. A positive attitude and an inquiring mind are essential…

… Attitudes are everything. Without the right attitudes students are unlikely to progress and achieve full potential.

… (Attitudes are) very important. Opportunities to broaden solutions come to those with open minds. There also needs to be a thread of discipline through the process…

… The attitude of trying new things, being open to experiment, not being afraid of failure … are all important to creative thinking…

… Open mindedness is the obvious attitude because it allows the designer to be aware of a broad range of influences…

… Attitudes are fundamental to wanting to wrestle with the conundrums that are thrown up when looking at new situations and resolutions.

… Confidence, boldness, risk taking, the belief that anything is possible are an asset (as is) … belief that you have something valuable to say…

Question 13: *What BELIEFS or other factors do you think <u>inhibit</u> creativity?*

The energetic responses to this question are also vital in establishing what Australian designers genuinely consider counterproductive to the development of creativity in design. Interestingly virtually all respondents concur that negative attitudes, especially doubting one's own capacity for creativity, represent the greatest barrier to creative development. In addition mention of various limiting environmental factors such as time and budget constraints recur. A rich and representative list of beliefs that are widely believed to inhibit creativity include:

… Old school thinking i.e. repeating what you've been taught… accepting the way things are … lack of opportunity … lack of resources…

… A closed mind, restricted education or life experience…

… The greatest inhibitor is the fear of being different and putting your neck on the line!

… A closed mind, ignorance, fear, low self esteem …

… To repeat identical procedures over time (with monotony) without acknowledgement of contextual changes can inhibit creativity. The fear of a mentor, no time to try and apply a concept beyond the understanding or scope of their own knowledge is a wasted opportunity...

… Arrogance …

… Compartmentalising the (design) process – very common in commercial practices…

… An inability to see how an idea can be applied to a specific usage (design for design's sake) or design without purpose or substance is detrimental… Inability to see shapes that reflect the location or client's needs… Restriction on ideas through conformity to style…

… Believing that the experts are always right… Most original creation has come from looking outside the box of known factors…

… Lack of critical thinking… believing you're not creative narrows your view of the world…

… Fanaticism about anything inhibits creativity. Belief that there is only one solution to a problem…

… (Believing it) 'can't be done'… 'we don't do it that way' … 'It'll never sell'…

… Belief that you're right (because)… you've done it before…

… Narrow field of vision…

… Negativity…

… 'It's been done before'…

… Pessimism, fear of failure… oppressive atmosphere… environmental distractions…

… All dogmas …

… Taking away involvement … not promoting individual awareness…

… Believing your ideas won't be accepted as they are too radical and need to be watered down can limit creativity…

… An education that presented knowledge as a commodity for consumption and that treated subjects in isolation…

… Commercial imperatives can inhibit creativity e.g. lack of time or money or client's difficulty in understanding creative outcomes …

… Repetition of tasks …

… Certitudes – thinking you know (better)…

… Inability to see beyond the technology … limited and superficial research… lack of experimentation…

… Uniformity of judgements … (leads to) negative attitudes…

… Lack of vision… lazy research that looks at only one source i.e. using the Internet as the only possible starting point…

… Unwillingness to try new things… not being open to experiment… fear of failure…

… Low self esteem… (negative) parental/peer/tutor conditioning… some physical environments…

… The need to be 'right' is a killer as is the desire to please someone else before being content with the response oneself first…

… Lack of confidence … self doubt… belief that creativity is not an important or relevant process to pursue…

…Belief that creativity is something that occurs without much input… also too much emphasis on rules, formulas, and the perceived 'correct' way to do things…

… Cost constraints… style standards/archetypes… technical constraints… intimidating/arrogant design supervisors…

Question 14: *What BELIEFS or other factors do you think <u>promote</u> creativity?*

The rich array of qualitative responses to this question are highly significant because they affirm very wide concurrence of assumptions underpinning the understanding of creativity shared within the community of design practitioners working in Australia. Central amongst these assumptions about creativity in design is the need for:
- belief in one's own capacity to be creative

- faith in the value of creativity and belief that anything is possible
- freedom and rich life experiences
- optimism, curiosity, open mindedness, self-confidence, courage and discipline
- a positive and conducive environment that supports risk taking and experimentation
- expansive research with cultural sensitivity and community involvement
- collaboration with others in tolerant and supportive working relationships.

The range of comments volunteered by respondents about beliefs that promote creativity include:

… There must be another way for everything… belief in one's own ability…

… The broader the expanse of influences and experiences the better to stimulate the creative juices…

… A professional attitude and self-discipline (that) focuses on a creative outcome… belief in yourself and (your own) ideas/concepts when everyone else is going in one direction and you are not!

… An open mind, knowledge, courage, confidence and intelligence…

… Free thinking… a child-like spirit… a sense of humour… an equitable balance of answers and questioning is healthy…

… Open mind… questioning what you are given… (asking) Have I got the real issues? Have we missed something? Push boundaries but be prepared to give…

… Open mind, ability to work collaboratively, patience… constraints often produce better results and stimulate the (creative) process…

… The realisation that creativity is about providing appropriate solutions that consider all the factors relating to a problem and look beyond those for a novel solution… to solve a problem better than expected…

… Acceptance of perceptions that may not be your current experience… A balance between the known and the unexpected… Experimentation is important and encouragement for a designer from colleagues and peers should be freely given…

… Humour… a willingness to suspend belief… acceptance of intuition…

… Belief in the future… belief that there is always a different way… belief that absolutely everyone knows something you do not…

… Belief that it is important to be creative… (when) our society values other things more… education (in) how to be creative… what is it?

… An open… inquiring mind…

… Maximum exposure to 'life' and its energy and diversity… A positive, inclusive working environment with a healthy sense of humour…

… Optimism…

… Positive attitudes in the workplace and elsewhere… Inspiration from various types of media and others around you…

…Optimism, necessity, relaxed atmosphere, fun and challenge factors…

… Belief that the problem solving and the learning process may never end…

… Wide interests, relationship to culture and environment… open mind… debate with colleagues…

… Stimulating teamwork and personal contributions… rewarding staff with praise when an idea is a winner… allowing staff to think outside the box… problem solving and taking responsibility…

… Nothing is impossible/all things are possible … or will be one day… it is inevitable that a solution will happen… a solution will be found to overcome technical difficulties…

… Believing in oneself is extremely important i.e. feeling confident to put your thoughts forward as your own thoughts, regardless of how they might be accepted … or not… (when) it is thought that there will be a good reception of the ideas, this can help promote creativity… A generally positive environment/situation is essential for a good design (to emerge). Negative vibes produce poor results…

… There is no such thing as something that is irrelevant to design… ideas are everywhere…

… The belief that there is always going to be at least one genuinely good creative outcome…

… Well treated creatives… happy designers make creative ideas…

… Faith in the skills and abilities of the designer allows for greater creativity…

… The belief that everything can be linked together…

… Freedom of work within own time range! Good environment with relaxed attitude…

… Experimentation, research, asking questions, no fear of the unknown… These (attitudes) bring additional qualities that can encourage creativity…

… (Creativity in design) is based on informed judgements and positive attitudes…

… Being in touch with a cross section of people doing (operating in) different (or the same) skill bases… visual reference… passion… seeing amazing art, architecture, design, film, theatre, museums … Having time to play with colour/shape/technique…

… An open mind, perseverance, love of process…

… A nurturing environment, which encourages risk taking and is tolerant of unfamiliar and perhaps unexpected resolutions…

… Freedom, diversity and exposure to world culture, events and people…

… A belief in the possibility that anything is achievable… that it is safe to experiment…

… Lateral thinking/thinking outside the square… belief in innovation and finding new ways to do things… breaking rules promotes creativity…

… Belief in the (many) ways creativity is manifest… encouragement to research… time to view other designers' work… interdisciplinary design studies…

… Life experience… dreams…

Question 15: *What specific PROFESSIONAL STRATEGIES are used to purposefully increase/enhance creative design outcomes in your field or workplace?*

Many broad considerations raised previously with respect to promoting creativity are reiterated in answer to this question. In addition specific reference is made to the importance of:

- conducive professional surroundings with a positive interpersonal atmosphere
- working collaboratively with other designers in the workplace who challenge and support each other
- critiquing design development throughout its evolution toward resolution
- employing specific group techniques such as de Bono's 'Six Thinking Hats', brainstorming, mind mapping or bubble diagram process analysis to make explicit design progress and pool ideas
- giving oneself over to subconscious design deliberation or allocating time for creative ideas to incubate
- actively participating in design community events and other outreach activities including competitions and teaching
- conscientious information gathering, critical observation, benchmarking and technical project investigation undertaken as applied visual and practical design research (not necessarily predicated upon or resulting in theoretical propositions)
- ongoing commitment to self education, professional development and lifelong learning by attending industry events, conferences, seminars, forums, workshops and specific purpose short courses subsequent to gaining initial qualification.

For example professional strategies cited by design practitioners to enhance creative outcomes include:

… Calm workplace environment … pleasant surroundings, warm and welcoming colours, supportive assistants, workplace structure, (office) layout and systems to reduce stress…

… Research into the location, the market, the client, the competition, then taking a deliberate quantum leap, rather than a development or variation on what has been done before … dare to be different…

… Industry collaboration… as the motivation coming from players in the economic world… (discussion of) similar outcomes derived from theory based participation in international design competitions where the brief is broad and often benefits global issues…

… (Attending) workshops, design reviews, process mapping, (interstate or overseas) trips, (industry) visits, research, talking to the trade, talking to clients, interaction with other disciplines, interaction within own (design) profession…

… (Apply) different thinking frameworks such as De Bono's 'six thinking hats'… brainstorming using mind mapping and bubble diagrams in peer reviews…

… Consider all jobs an opportunity to do something special, novel, memorable i.e. to take each opportunity and look at what extra can be offered or done… offer solutions outside the obvious…

… Hiring specialist (business) professionals to allow my creative process to flow e.g. an accountant…. Attend specific courses to increase product and industry knowledge… Join and work with associations (like DIA) which stimulate creativity or help networking for business…

… Sharing of ideas and experience through forum discussion and publications… We regularly pull apart other products and look at how others are solving problems… read, read, read…

… Collaborations, strong clean briefs, use of new technologies, (participation in) competitions with interesting briefs, exhibition work …

… Regular staff forums, challenging ideas regularly, seeing other peoples' work…

… Critiques are really helpful, either formal or informal… pooling ideas and generating/bouncing concepts off each other…

… Exposure to the widest possible range of art and design disciplines and cultures. Presenting design solutions to clients/end users in a language to which they can associate or relate i.e. design as a strategic business tool for creating high performance workplaces…

… Brainstorming, regular design meetings, trend information circulated through the company, seminars, customer presentations, supplier meetings, sales generation and critiques…

… "Innovation Spiral" (proprietary process) combined with observation and brainstorming…

… Exercise (a good deal of mountain biking)… The intensity of the sport means that the conscious mind is fully focussed in the present time allowing the subconscious to solve problems…

… Research, benchmarking global design trends, (developing) collective team scenarios of concepts intended to stimulate design development… external recognition of contributors to design excellence (e.g. awards) …

… Research, historical factors… extending into unknown territory… attending professional development courses… travel…

… Sending staff to training courses to increase awareness and personal knowledge… make (staff members) feel their contribution to the team is important… give them (increasing) responsibilities as they develop within the organisation…

… Brainstorming sessions up front at the start of projects… multidisciplinary team inputs… consultations with technical experts, suppliers… research markets and patents…

… Listening… gaining wide experience by getting out there and seeing what is achievable, and has been achieved… is essential. Beyond that I have the strategy of sitting quietly and letting things come to me, rather than forcing ideas. Working at home is great for inventiveness as it is a surrounding that I am comfortable in…

… We work to a design manual/style guide, which can be limiting at times. It is important that we listen to customer needs and try to meet their expectations…

… (Intentionally) cross (referencing) ideas with no specific meaningful link (to see what might result)…

… Coffee… relaxed meetings in brief discussions… freedom to work in own time scale as long as the work is completed…

… Exposure to varied professional processes such as project management, decision making, timelines…

… brainstorming… open minds… self education…

… Meeting as many professionals on a high level of creativity as possible… Teaching … being in touch with today's students/tomorrow's designers… passing on knowledge…

… Awareness and involvement in design locally including exhibitions and professional practice…

… A clear communication brief with explicit operational parameters such as budget and timeframes supported by meaningful engagement and mentoring…

… Brainstorming… sketching… condensing limits…

Question 16a: *In your experience and/or opinion, what 'implicit' or 'explicit'*
CREATIVE TEACHING STRATEGIES might help to overtly improve
creative results and student confidence in the classroom?

This is a challenging educational question that not all respondents elected to answer. However those that did address the question are expansive in sharing their personal observations and suggestions. Again responses tend to overlap with pragmatic information provided in answer to previous questions. An apparent assumption underlies many responses to this question about creative teaching strategies in that it is taken for granted that industry based design strategies can and should be replicated in teaching practices in design education. Where professional design principles and practices are emulated in educational settings, practitioner responses offer limited extrapolation of the pedagogical engagement with the nature of teaching practice whilst orchestrating design oriented practices amongst students. This suggests that design practitioners working as design teachers tend to view their encounters with students on projects as similar to how they might view their own professional project encounters with colleagues in industry. However in the classroom the design teacher generally steps back from the participatory role of designer to assume the position of mentor. This draws attention to the importance of an educator's pedagogical self-awareness and understanding of the role of the teacher in intentionally providing a 'safe', 'open', harmonious, tolerant and encouraging environment for design learning.

By implication creative learning is often assumed to be implicit within cognitive and skills based practical studio teaching strategies. Therefore the incitement and nurturing of individual creativity in design students is largely treated as incidental to the simulation of design projects, or the modelling of design behaviours in the classroom, rather than being overtly targeted in curriculum development or teaching preparation and delivery in traditional studio based design education. Some respondents recommend a more in-depth interaction between learners in the classroom to help students share ideas and reflect upon design issues and methods in order to better understand their own and other peoples' creative processes. Other respondents to this question express common practitioner concern that students need first hand exposure to authentic design activity in industry via direct student contact with design firms as employers and interaction with practising designers working on real projects in workplace and community contexts.

The range of recommended creative teaching strategies include:

… Discussion, brainstorming, research … encouragement for students to follow 'gut' feelings without fear of criticism…

… Lateral thinking, brainstorming or anything else that might help students to break down or through limiting beliefs or attitudes… (to) expand their vision and be more observant about the world around them…

…Visual workshops… exposure to more international (design)… it is always prudent to know and understand (how design) principles are applied… such knowledge is vital for success…

… Visitation of professionals or members of the community who have a common or possibly a remote connection with the project in hand… (because) the final solutions in conceptual form are not all that removed… (design) is a search for 'essences' and 'simplicity'…

… Deconditioning… presenting possible scenarios either fantasy or proven… it is important if possible to offer both…

… Interaction with industry, trade shows, projects, part time work in industry, individual travel, 'live' process with a client, joint project with another discipline and /or faculty (e.g. design/marketing), course swapping for a project… If you can't get a job in your professional area get one in a parallel area. You will always pick up useful information that will be of benefit to defining the design issues…

… Different thinking frameworks… de Bono's 'six thinking hats', brainstorming using mind mapping and bubble diagrams, peer review, verbal and visual communication skills i.e. there is not much point being creative if you can't communicate it…

… Lecturing staff with recent (industry) experience in the reality of application of design or failing this visitors… contacts who can show aspects of the application of design. I think the design education industry is seriously impaired by virtually nil turnover of key staff… students need to be (better) grounded and realistic (if they are to have) successful careers…

… Background information… about the 'whys' of design… the value of research… hands-on practical creative sessions using multiple fields of media… training in recognising their field of expertise… lots of encouragement and recognition… training in the value of networking and how to go about (finding) outlets for their creativity… management to bring the class together as a unit for (creative) solidarity…

… A supportive atmosphere encouraging risk taking… a range of (teaching) strategies based on various works e.g. Edward de Bono and Betty Edwards etc... and self-developed strategies…

… Study, learning and practice of typically used creative strategies… presentation of lots of case studies… conducting well organised design projects with adequate staff levels to provide useful guidance and feedback (to students)…

… Finding out what creativity is, not assuming they know… giving a vast array of techniques to generate ideas… (student) confidence increases when they see that they can come up with interesting creative solutions… lots of examples of how different people work… take them through the whole design process, always including evaluation… the more (students) do, the more they understand, the better their confidence…

… Bouncing ideas off each other… rapidly getting ideas out… this frees (them) up… stops them agonising over details… thinking in broad concepts is great… students need to be able to express their ideas… anything to encourage this would be great…

… Educating on trends and what's going on in the world design wise…

… A broad arts-based year one curriculum to include sculpture, painting, ceramics, ikebana, textile design, graphics, jewellery making… a thorough grounding in manual drawing and sketching and

presentation skills. This is essential for understanding and articulating the 3D process of design prior to acquiring CAD skills…

… Give (students) room to make mistakes… give them specific challenges…

… More round table discussions with each (student) given opportunities to express themselves…

… Lateral thinking and the concept of '101 ways to skin a cat'… (understanding there are) no 'wrong' answers (in design) only better answers… build confidence in allowing the student to judge themselves…

… Simple exercises that emphasise definition and analysis and solution of problems… emphasise the discipline of the design process and methodology…

… Encouragement to explore… going from wide range brief to very narrow brief… verbally explaining your process… visually explaining your process… don't allow students to nominate their own subject (matter) or brief (because) this never happens in professional practice…

… Make creativity a fun thing to do… challenge (students') thinking and make them learn to challenge their own assumptions constantly… peer critique can also be stimulating…

… Practical workshops on how to select participants and lead brainstorm sessions… analytical thinking… introspection… case studies of successful innovations… salesmanship…

… Encourage the student to 'give it a go' and never knock the results… try to see where students are coming from and bring out the fundamental ideas… (because) what is in (the student's) mind might not actually be what they produce either through a lack of communication techniques or inability to draw for example. It is important to understand the ideas behind the results, not just look at the visuals…

… An assessment system that rewards risk taking and the generation of a large number of ideas…

… Reasonably tenacious commitment to ensuring students develop their own ideas… (and individual) confidence in the process… plus the development of social, intellectual and communication skills which will enhance the student's ability to function as a creative individual…

… More examples of other reputable designers and artists (work) should be incorporated into the course structure… (along with) an understanding of what inspired those individuals, why they were successful/popular or unpopular in their time… (i.e.) what makes a successful design?

… Students need to be enthused, inspired. Passion is one of those elements that increase confidence… Creativity ultimately comes with the abolition of certainty within ideas… (where) everything is valid… only the way it is done changes the (end) result…

… Brainstorming, deconstruction of concepts, reflection, critical analysis, exposure to creative work, exposure to the creative practices of professionals… finding an aim/goal/concept that ties the design together… self improvement books, seminars, CDs… teaching studio workshops on 'thinking' and successful mental attitudes and thinking (skills)…

… Working with students to develop their vision… Showing (students) possibilities for extending their limited knowledge. I believe in visual communication – a picture tells a thousand words. Show them things… projects that use different ways the student sees/develops/interprets… both free and more controlled (methods)… I would love to see the same open approach used by children at 3 as students at 20 (years of age)…

… Open dialogue and discussion… allowing students to try even if they don't succeed… providing a safe 'non-judgmental' (learning) environment… respecting all students' opinions, even if they differ from my own or the prevailing trends…

… More interplay with industry in both projects and having the industry representatives on marking panels…

… Humour… having a good laugh at something that is inane or over-the-top and then (analysing and) understanding that (human) response through discussion… a regime of regular discussion and critical assessment in an environment which is open and supportive and which brings in ideas (and people) from outside of the specific teaching/learning cohort…

… Expression of creativity in the design process… no matter what the result. Secondly the understanding and documentation of the process (is important)…

… Snowballing of ideas is a good way to encourage students to take their first ideas one or several steps further… i.e. taking one design idea and manipulating or altering it in several variations to add to its complexity…

… exposure to a variety of work from the related or unrelated genre… non-literal projects and projects focusing on selected skills while using cross disciplinary subject matter… students must however clearly understand the relevance of cross disciplinary study…

… To be able to discuss real life workplace situations and experiences so they (students) are inspired… possibly visit manufacturers/designers and have a tour of the warehouse and sales office…

Question 16b: *In your experience and/or opinion, do you think such strategies can be identified and intentionally applied in terms of course structure, curriculum content, training package development or teacher training in your specialist area? If so how? If not why not?*

The second part of this question specifically asks respondents to decide 'if' and 'how' creative teaching strategies can be explicitly incorporated into formal educational course design, development and documentation.

The majority of respondents, thirty five from a sample of forty eight practitioners, unequivocally assert that "yes" creative teaching strategies can and should be overtly incorporated into the structuring and documentation of design courses. However views differ widely as to how this pedagogical outcome can be best achieved. Many reiterate pragmatic suggestions already noted. Others strive to articulate overarching principles rather than specific actions. One eighth of respondents disagree and the same number did not attempt this part of the question leaving it blank or admitting a lack of teaching experience for example.

It would seem from the following remarks that those practitioners with reasonable teaching experience do understand the function of course design and documentation as vital to the planning of student learning and the management of teaching practices. This involves separate considerations from choice of course delivery mode, design methodologies, class activities or assessment tasks. Intuitively most respondents appear to empathise with the interpersonal dimension of individual and group based learning to design, sufficient to suggest the value of adopting specific attitudinal, psychological or

social approaches to teaching that are thought to improve creative outcomes for students. Assessment strategies are noted in passing as a pivotal factor influencing the evolution of creativity in students. Reservation over a lack of opportunity to implement creative teaching strategies is expressed in the vocational sector, more so than in higher education. This is due to time and other constraints of competency based training, which actively exclude VET teachers from centralised training package or curriculum development processes predicated upon units and elements of competency, defined in relation to performance criteria that are overtly predetermined and often quite rigidly implemented.

Affirmative responses to the coverage of creative teaching strategies in course documentation include:

… Can be included as much as possible… unfortunately time and constraints have squeezed much of this out of our existing courses… it seems to have become a luxury we can't afford (in TAFE)…

… Creativity should and could become a subject in itself and 'lateral thinking' exercises could form one basis from which to build 'design specific' processes within a course…

… I believe this would be possible – to interact with outside specialists so much more with students. Creative designers need to be encouraged to explore the 'how to', 'how is it done', 'how to accomplish'… Everyone has a dream. So it may be followed and achieved…

… Yes (via) formally tested or observed thinking competency, feeling competency, seeing competency, deriving competency, communicating competency, documenting competency…

… If the basics are sound and the standards are similar cross-over between students, courses and countries should be encouraged…

… Definitely – with the exception of visual communication skills… none of these (professional and creative teaching strategies) …were taught when I studied design…

… I think all (creative teaching strategies) can be applied if looked at as a management issue on the part of the teacher and teaching facility. Individual and group assessment is essential but more essential is the application of strategies to make the group work together and individually, while together (in class) and in the future and when the learning process has passed to 'industry use' whether by the individual or part or whole group…

… Yes! In Semester 1 of 2003 I introduce a new course entitled 'Creative Thinking'…

… Absolutely… (creative teaching strategies) form the cornerstone of any design course. I am amazed you even ask the question!

… Absolutely – I teach all the (strategies I identified in question 16a). The only alteration I've had to make was to de-emphasise the role of marking grades in projects. We often group evaluate and mark so (assessment) becomes evaluation rather than focused on (allocation of) university grades…

… (Yes however) one of the main issues with (employing) new graduates is they struggle to be creative between 9.00 a.m. and 5.30 p.m. and come up with ideas when they are required. In the harsh reality (of the workplace) no one can wait too long for inspiration to strike – (creativity in design) needs to be cultivated as a constant, on-demand skill…

… Yes…

… Yes – in a broad arts based year one curriculum. Teaching of CAD skills should commence in the final 50% of the curriculum program not at the beginning… use a wider variety of industry professionals as

sessional lecturers out of context e.g. an Ikebana specialist to lecture automotive/industrial design students. This stimulates 'cross pollination' of ideas…

… Of course, but I cannot say what specifically. I would have thought (creative teaching strategies come into) every subject at every level…

… Yes, by introducing more teamwork activities and trying to come up with a balance of personalities/beliefs/ideas in these groups…

… Yes…

… Yes, by implementing tasks and challenges that require creative thinking and problem solving…

… Yes definitely. Much of the design process is linear and based on logic. These parts must be managed rigorously and can be taught. I refer to the analysis of the design brief…

… Creativity is a universal part of design no matter what field of design. Methodologies can assist students in the learning process, but essentially its about using one's intelligence to solve problems or create new ways of looking at a problem.

… The mechanics of these (educational considerations) are relatively easy… But how to change attitudes is the hardest aspect… These require attributes for a creative change agent that are held deep within the personality and psyche. Students have to be prepared to understand how and why they need to develop a 'why not' approach…

… The way you use creativity can be enhanced… the strategies are more about the way to teach, rather than what to teach. However I am sure that a creative course developer could build in assignments that assisted with (creativity development)!

… Yes, by structuring assignments in such a way that 'creative' solutions are required and rewarded…

… Yes… (however) to answer how would require writing curriculum content. In general terms… any activities (intellectual and/or practical) which develop the (abilities I noted previously in questions 15 and 16a) would be constructive i.e. own ideas, confidence in process, social, intellectual and communication skills…

… Yes… I think specific units devoted to the history of design were particularly inspiring to me and my peers… of course the effectiveness and usefulness of this information is influenced by the enthusiasm and ability of the lecturer to make classes interesting and relevant…

… Yes… more specifically as teacher training…

… Yes… change classroom structure and become focussed on design as the core! Let the technical aspects become less important!

… To some extent it is possible to include such strategies or similar methods in the course structure but it is no guarantee of success…

… Yes most definitely. Educators are not just teachers but mentors. Leading/leadership by example and encouragement… CDs, books, films, tours and more…

…Yes, by helping students develop their vision. Showing them possibilities… communicating visually… varying between free and controlled projects that encourage different approaches to students seeing/developing/interpreting…

… Yes, by allowing time for these things (as noted previously) in conjunction with theoretical and practical advice (to students)…

… (Yes, however)… any link with industry is difficult to structure as you are at their mercy in terms of their own commitments and job requirements. .However (industry experience) remains the most positive enhancement to any brief…

…Yes. It (the creative teaching strategy) is somewhat independent of the course structure and curriculum content… (because) it hinges upon the attitude of the teacher to have a high level of engagement with the students, to embrace difference and foster individual lines of investigation…

… Yes… snowballed ideas could be illustrated and assessed (as case studies for example)… When documented, these illustrations show the progression from original concept to final design…

… Yes. If someone has a good relationship with a certain manufacturer most would be willing to have students look around (at work being done in industry)…

Dissenting views arguing against the relevance of creative teaching strategies include:

… I think it will require government intervention to implement a system that forces teaching institutions to restructure staffing policies so there is a rotation of key staff positions or methods of continual assessment of teaching skills. I do not think a purely academic approach to teaching (design) is realistic due to ever changing technologies for development of ideas and production of same…

… No experience relative to this question…

… I believe a person is either creative or they are not… the basic ability to come up with creative solutions cannot be taught…

… How to teach passion? Practices can be put down but they won't reveal this kind of exciting result and follow through…

… No, unless the fundamental process in early stages (of education or design development) are less structured … with a 'free and open' result option…

… No. It seems that there is barely enough time to adequately cover all the necessary skills even on a rudimentary level…

SECTION C: <u>THEORETICAL INFORMATION</u>

Question 17: *What particularly significant personal or professional experiences influenced your views about creativity?*

Reflective answers to this question make passing mention of the impact of formal education, reinforcing instead the importance of interaction with peers and lifelong learning via participation in selected industry based seminars, professional workshops and conferences. International travel and aesthetic experience of other cultures rates as perhaps the most significant boon to personal creativity mentioned by many design practitioners. Some mention is also made of family encouragement and there is general respect for the contribution of broader life experience in the maturation of individual creativity and professional confidence as practising designers working across different disciplines.

Openness to emotional and sensory stimulus, as well as intellectual engagement with a wide range of issues, events, circumstances, people and experiences are generally acknowledged as being highly influential in shaping the self knowledge of creative designers. From a holistic perspective it seems evident that no singular influence or career path determines the creative convictions and self-awareness of practitioners. Instead personal opinions and private beliefs about the nature and importance of creativity in design continue to develop throughout the personal lives and professional careers of respondents. Educators or employers reflecting on the creative potential of others offer interesting perspectives on the extent to which creativity is believed to be favourably influenced by certain factors (or not), including education.

The range of personal and professional factors influencing the individual views of practising Australian designers about creativity vary widely over the following:

… Personal experience has shown me the wide variation between individuals' creative abilities. I believe creativity can be expanded, increased, stimulated, motivated etc, but it is hard to make strawberry jam out of pig shit (pardon the expression)!

… The most important influence, both past and present, is the stimulation initiated by travelling in Europe, Africa and Mediterranean countries…

… 'Pop Art' and specifically Andy Warhol, music and the fact that music more than any other art form can create powerful emotions. I strive for design to achieve the same impact…

… When I was studying design (in the 1970s) we were encouraged to use our initiative – to explore, practise brick-laying, cement rendering, understanding ventilation, aspects of site, client personality …

… Attending local, state, national and international seminars and workshops from fields outside one's own… being taken seriously as a child… being taken everywhere with limited babysitting….

… Meeting creative people at school, college, work, as clients and friends, TV, media, film, travel…

… Working with two brilliant designers neither of whom finished degrees or 'starred' at university makes me think that a large part of creativity is innate…

… I had a shop in Fortitude Valley. On one side were original, but conservative, street furniture designs, on the other side a variety of interesting domestic furniture pieces such as tray mobile, stereo-cabinet, table, desk, mirrors and other items. I sold $250,000 of the street furniture the first year and <u>none</u> of the special pieces!!

… Childhood experiences and financial and personal growth needs…

… Needing to produce original outcomes as a designer… having to find ways of teaching innovative thinking...

… University, travel, work…

… Researching other designers…

… I don't have any views about creativity…

… Negative influence of employers and clients that disregard or repress creativity… (Positive influence of) travel and wide life experiences are great to get the creative juices flowing because they are inspirational… managing a team of designers with vastly different skill sets…

… clients and external sources of information e.g. magazines, journals, personal views and tastes…

… Working with an Italian architect in Italy for approximately three months…

… I do not have specific views about creativity. Everyone who is positive is creative. Confidence is the key. I would have been more creative at college had I had more confidence. I did not have one (particularly influential creative) experience … I think of creativity as a process…

… Creativity was something I knew very little about expressing until college … where it was expected and demanded… To me creativity and being creative is a very rushed exercise that is often forced upon people, instead of being nurtured…

… Experience…

… It is ongoing… the way the subconscious provides so many solutions…

… Working alongside Peter Geyer for ten years…

… Thirty years experience in practice… wide range of work… wide range of clients and budgets…

… Working in Italy for twelve years made me see things from another perspective… Thinking globally has a big influence on approaches to design especially on a large industrial scale…

… Reflection upon why I succeeded with particular projects… Persistence can triumph over ignorance but must be overlaid on a modicum of natural talent and personal belief in the validity of your (own) ideas… Practical experience of reviewing countless hundreds of student portfolios…

… Travelling the world and seeing just how different people and places are… It puts all the indoctrination of our upbringing into question and helps broaden the mind… I have visited fifty-seven countries which provides enormous cultural diversity, different uses of materials and different needs for home and decoration…

… The success I've enjoyed in those moments when I've produced something that I'm truly happy with… and that works… and the frustration when the opposite happens…

… Definitely being able to bounce ideas off my peers has been paramount to the success of my work…

… The reaction from my students… The number of persons wanting to specialise in my area though being average/weak (students academically)… Enthusiasm comes through…

… Speed at which design solutions need to be met… This tends to build better and more creative solutions…

… The potential of interactive multimedia is limitless. This realisation six to seven years ago … (with) a class of students who responded well to (my) teaching strategies and came up with interactive products… If it can happen once then it can happen many times…

… A well-rounded study of oriental/occidental thinking, culture, problem solving and vision…

… Creative encouragement at an early age… Mother was very artistic… Encouragement I think is a moral word when talking about creativity… my tutors at college … made me aware of what I could achieve… I find seminars where experts in their fields talk about their … viewpoint a great creative source for future projections…

… Working with students and watching their different creative solutions come to fruition… art galleries and exhibitions…

… Travelling the world… architecture and fashion…

… You could say I am married to it!

… a dislike for reading and a subsequent discovery of pen and paper…

… The most significant experience that has influenced my view of creativity was studying to teach design at university. The content in the units I studied thoroughly covered ways to encourage creativity in students…

… Inspirational fellow students while at university… Seeing quality work from peers encouraged creativity to achieve more fulfilling outputs (myself)…

… My studies in Italy helped me develop my personal style in fashion illustration, which continued to influence me in design from then on throughout my career in the workforce…

Question 18: *What particular practitioners, authors, theories or texts informed your views about creativity?*

This question was specifically included in the survey instrument to elicit information on the theoretical underpinnings informing practitioner views about creativity. Data suggests that practising Australian designers and design educators do not generally acknowledge or identify with the vast body of formal cognitive psychology and similar research into creativity theory dating from the latter half of the twentieth century.

Instead most respondents cite a diverse array of sources from either design history or popular literature. Prominent amongst these references are the design principles and educational tenets derived from the German Bauhaus and certain pragmatic techniques for marshalling creative thinking. These include Brainstorming and Mind Mapping as well as recurrent acknowledgement of Edward de Bono's various problem solving strategies like 'lateral thinking' and 'Six Thinking Hats' for example. Betty Edwards is mentioned in relation to visualisation, the role of drawing in art and design practice and split brain theory. The creative careers and works of prominent artists and designers are also cited as having been instrumental in shaping the personal views or stylistic preference of individual respondents in relation to design content in specific disciplines. Various respondents cited no other influences except their own life and design experience. Ten respondents from the sample of forty eight made no response to this question.

Overall, conscious awareness of creativity seems to not necessarily be separated in the minds of designers from broader considerations informing design practice. Therefore it may be reasonably deduced that most designers do not adhere to one or other formal theory of creativity or design at either an academic or practical level. Instead most practising designers tend to tacitly exercise creativity utilising an eclectic mix of informal and pragmatic assumptions about the nature and application of creativity implicit within the experience of doing and thinking about design.

Influential practitioners, authors, theories or texts cited by respondents as having informed their views on creativity include:

… Practitioners: Antoni Gaudi, Salvador Dali, M. C. Escher, Stuart Wilde, Norman Foster, Le Corbusier, Bauhaus artists, Frank Lloyd Wright…

… Practitioner: Nina Campbell…

… de Bono and to some degree artists like Leonardo Da Vinci to the present modern film and visual effects…

… Practitioners: David Hicks, Elsie de Wolfe, Nina Campbell and the Bauhaus Principles…

… Conferences, workshops and guest speakers at the International Council of Societies of Industrial Design <icsid.org > … no specific articles have been pursued by me or offered by others…

…Practitioner: Christopher Alexander… Edward de Bono…

… The work of Frank Lloyd Wright, Antoni Gaudi, Eileen Grey, others and stories about their lives and experiences as designers I think have been inspirational and useful in understanding what being a designer is all about…

… Artists – hard working but not particularly famous… Bauhaus – I always admired application to life… Architectural forms – Frank Lloyd Wright, Harry Seidler… Applied design for everyday use…

… Various works on rhetoric… the visual… de Bono, Nicholas Roukes, Betty Edwards… more recently various approaches to understanding consciousness and the so-called right brain/left brain model of thinking…

… The usual suspects all have at least some sort of contribution…

… "Drawing on the Right Side of the Brain" by Betty Edwards … Anything by de Bono…

… Practitioners: Phillippe Stark, Ross Lovegrove, Alberto Meda, Joe Colombo, Ettore Stottsass, Louis Barragan, Jean Nouvel, Antonio Citterio, Andao Tao, Glenn Murcutt… Future Systems… 'Domus' Editorials (1978-2001 survey done 2002)…

…No one stands out…

… I choose to make my own ideas about creativity… Question: Is it very creative of us to take on board what everyone else has to say?

… Practitioners: Ideo.com… and de Bono…

… Lecturers who introduced me to Mind Mapping, Black Boxing, Lateral Thinking, Brainstorming…

… Practitioner: Frances Duffy…

… Practitioners: John Styles – architect and teacher with whom I was 'articled'… Harry Seidler, Glenn Murcutt, Carlo Scarpa… Edna Walling; Joan Campbell… Duany Plater-Zybeck, "Small is Beautiful" by E. F. Schumacher…

… Edward de Bono – lateral thinking is a great way to problem solve…

… Can't say anyone alone… My own cumulative experience of designing, selling and managing a successful corporate team… "Zen and the Art of Motorcycle Maintenance" by Robert Pirsig affirmed

many of my views… Many other articles on the mind and operation of the brain have contributed… together with personality tests of design applicants measured against subsequent performance…

… None … I am a self-taught designer building on life experiences…

… After thirty years in the industry the list would be longer than I could document… Of particular note would be the Constructivist Period, the Bauhaus, Renaissance painting and contemporary digital design (not of itself but for its desire to explore)…

… No text… I'm usually informed everyday by design space and form and what I see around me…

… "Interactivity: A Forgotten Art" by Rod Sims http://it.coe.vga.edu/itforum/page10/paper10.html …

… "The Magic of Thinking Big" by Baird Schwartz… "Personalities" by Florence Littaner… Practitioners: John Nash, Renzo Piano, P. Rudolph, Isogawa, Isozaki, Im Pei…

… 'Viewpoint'… Martin Raymond and Christopher Sanderson of 'The Future Lab' – London… David Shah 'View'…

… Art history, galleries and exhibitions…

… Practitioners: Karl Largerfeld, Yves Saint Laurent, John Galliano… basically all the French couturiers and the marvellous way they cut and drape… especially Vionnet in the 1930s with bias cutting…

… No particular orientation but I am interested in the emerging interdisciplinary area of neuro-psychology and philosophy referred to in A. Damasio's writing…

… None… Life experience and imagery is the best for creative stimulation…

… Edward de Bono's "Lateral Thinking"… Blooms Taxonomy…

… My teachers in Italy taught me to look within myself and not follow others… This was the best advice ever given to me and I felt myself free to create what is me!

Question 19: *Do you believe creativity can be improved by astute and better informed creative teaching strategies? If so, how? If not, why? Please explain.*

This is a culminating question. It tests support for the notion that better teaching methodologies can enhance development of creativity in students. Those respondents who believe creativity can be improved are asked to nominate 'how' creative teaching strategies might become more 'astute' and 'better informed'. Respondents who disagree are asked 'why', while respondents also have the option to declare their own uncertainty by answering 'possibly, I'm not sure' and explaining their reasoning.

The data evidences majority support amongst professional Australian designers for the proposition that astute and better informed teaching strategies can improve creative outcomes for students. Thirty from forty eight respondents offer a wide range of opinions as to how this may be achieved, often referring back to comments made to previous questions. Key observations note the merit of encouragement, freedom to explore, experiment and play and scope for engaging with the notion of 'What if?' Only one respondent stated 'no' to this question arguing that '…if the student doesn't have the creative capacity, nothing will help them – much like dancing'. Nine respondents

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expressed uncertainty as to whether or not more astute creative teaching strategies can heighten the creative achievement of learners, explaining their ambivalence against differing criteria. Four respondents did not answer this question.

While there is clear support for the efficacy of better informed creative teaching strategies responses generally focus on what students do in response to instruction. Emphasis is placed on teachers ensuring the relevance of the teaching activities to design practice with respect to knowledge and skill development in learners. The pedagogical knowledge and skills of the teacher rate virtually no mention. There is only very limited comment or reflection upon the role and self awareness of the teacher or the nature of the interpersonal relationships that develop between design teachers and learners. Neither is there much recognition of the fully corporeal experience of teachers and learners, in practice based disciplines such as design, sharing a creative journey that requires mutual participation, confidence, enthusiasm, physical and emotional engagement and tolerance for ambiguity within exploratory learning frameworks. Attitudinal considerations are inferred but not pedagogically extrapolated except at the notional level of stimulating, encouraging and facilitating opportunities where the creativity of students may flourish. One interesting comment links the pursuit of the creatively oriented 'Why not?' principle in design to stimulation of a latent change agency within students, conditional upon individual learners exhibiting an inherent predisposition toward this attribute.

Indicative responses to this question follow:

… Yes… By offering as many design techniques as possible combined with stimulating and appropriate exercises, sharing of ideas and research…

… Yes… I am not a teacher but I'm sure a good educator can think of ways to stimulate creativity… maybe by developing a theme in different creative ways by drawing on particular influences…

… Yes… Design has become much more intelligent. Ideas plucked out of the air have no basis in design. But 'creativity' seems to be considered an elusive ingredient, almost magic! Students have to learn how to think on many different levels at the same time, to basically find a creative solution for fitting a square peg in a round hole!

… Yes… Teaching and understanding the psychology of colour… applied to a basic understanding of the psychology of the client/family/individual. I believe these are basic requirements of creative people to learn before beginning a career in dealing professionally in the interior design industry…

… Yes… I do not participate in a better informed creative teaching strategy environment, but believe discussion would lead to implementation and modelling of such a strategy…

… Yes… Students must learn to apply creativity in the design arena, not indulge in it (for its own sake)… Students should be exposed to the processes of design, not left to invent them. The harnessing of creativity to answer design problems is difficult in itself… if students are taught how to go through the process they can focus on the issues that are important for their growth i.e.:
-   Be creative without technology for a while
-   Be creative in groups
-   Set creative projects with other disciplines/groups
-   Experience design
-   Evaluate not just the fashionable and current… Study McDonalds, Lego. These are everyday examples of design around us.

… Yes… Obviously I have strong view about the education system having an intimate knowledge of is structure. It seems logical to me that the better informed, the more experienced a teacher is the more inspirational they will be. Most students are young and very impressionable. So it follows that the more useful and contemporary the information they receive, the better informed they will be. I think this requires more than long term senior lecturing staff employing junior staff to teach CAD skills. Staff must be able to show by example what it is to take an idea from concept to reality. Only then can students fully understand the process. Projects shown by senior staff need to be commercial and realistic.

… Yes… Teach the background so pupils know why certain practices are accepted or not. Identify individual talent… Emphasise working practices, not 'laid on a plate' (procedures) for everyone (to follow)… Encourage the unusual and abstract… Identify marketability… Keep class sizes down… Manage the mix of people in groups in classes… Emphasise group dynamics and use them for positives… Conduct group discussion about class work… Teach presentation skills… the best design can stay on the shelf if not presented properly…

… Yes… Structured workshops and assignments undertaken within particular frameworks designed to encourage students to move outside their mental comfort zones…

… Yes… If the teacher understands the creative process, and they are a 'good teacher', then the students have to benefit…

…Yes… Education on trends and what's going on in the world design wise…

… Yes… By teaching it!

… Yes… Helping students open their minds… Challenging their thinking… Teaching multiple approaches to creative thinking… Helping students understand how the brain works…

… Yes… In the first years of any design course no matter what the field creativity should be encouraged and promoted… In the latter years of a design course practical knowledge of how to turn a creative idea into reality should be encouraged…

… Yes… I do not believe creativity itself can be taught – it is inherent in our nature… However creativity can be enhanced with the right encouragement, and assisting the student to explore possibilities without fear of ridicule… Also teaching techniques for communicating ideas rather than generating ideas is of paramount importance…

… Yes… Creative teaching strategies can help give students the knowledge and experience to better develop all their skills… intellectual and practical…

… Yes… (Encourage) new students to become more design problem focused… Give them space to see problems to solve (i.e. problem finding)…

… Yes… It can be informed by better creative teaching strategies and the passion of the teacher for his/her subject… The strategies then have more potential to inspire… The strategies alone may not work even if they are well planned… Without them there is limited potential, but with them we still need additional tools such as passion of the teacher for the subject…

… Yes… Aim/goal/concept that ties the design together (is important)… Self improvement… 'Thinking Big'… Teachers as mentors who lead by example and encouragement…

… Yes… This works for some people… I don't always find for myself that teaching strategies work for me… I think that you teach and influence in your 'language' and you 'take on things'…

… Yes… In high school Design and Technology staff rooms there is a prevailing attitude that kids 'can't design'… This is unfortunate because then students are not given adequate freedom to design, and end

up doing the same projects their parents did at school… Better informed teaching strategies are brought into schools by new teachers. If the existing staff are not teaching creatively, new staff have trouble implementing new strategies… some schools do Design and Technology very well and their students gain many positive benefits through new ways of learning…

… Yes… But the strategies could be expensive to implement such as smaller studio groups, more 'designer' environment or studio space, better equipment etc…

… Yes… By establishing a value for personal achievement, other than can be tested in a HSC oriented exam system, so that parents are told that it is valuable… By providing environments for learners where there is both resources and time to play/experiment and successful outcomes are not necessarily expected… By a study of leading creative movements and the circumstances in which individuals were able to flourish… Through a discussion of how makers and visualisers help imagine and engineer our possible futures…

… Yes… Less structure early… more exploration early… Analysis mid way (through course)… Process and structure later…

… Yes… Regular workshops and training to remind teachers how to encourage creativity in students… This could refresh ideas and introduce new ways for teachers to promote creative thinking in students…

… Yes… Keeping in touch with the output of the design industry now, in the past and in the future can help students break obstacles stifling their creativity locally… An uninformed teacher can't provide this…

… Yes… A teacher needs to look at the individual student and their individual strengths… They (students and teachers) also need to be able to see how they can look within themselves to create what is truly theirs… This would not be easy however… (It is) a challenge…

… No… Because if the student doesn't have the creative capacity, nothing will help them – much like dancing…

… Possibly, I'm not sure… Can (possibly) be improved by teaching listening and communication skills, thinking frameworks and team skills…

… Possibly, I'm not sure… I think inherently creative students may be hampered by 'teaching strategies'… However I think it could be really useful to kick start a lot of students to take the first leap in developing a new idea/concept… The essentially 'non-creative' based designers are probably great at something else (usually project management) and may never really excel at creativity… I believe there is still a real place for these ones in the industry…

… Possibly, I'm not sure… I'm not sure creativity can be improved, but I think it can be encouraged through specific teaching strategies to seek solutions from sources outside existing parameters e.g. 'What do architecture and flamenco (dancing) have in common? – Rhythm, balance, colour, contrast and a journey with a beginning and an end'… These commonalities can act as a catalyst to stimulate lateral approaches to design solutions…

… Possibly, I'm not sure… I think it (creativity) entirely depends on the individual… Creativity is something everyone has, but a lot of people aren't sure how to use it… Finding ways to help people express themselves more clearly might overcome this…

… Possibly, I'm not sure… Much of the design process is linear and based on logic… I'm not sufficiently versed in current educational theory to comment…

… Possibly, I'm not sure… While you would hope that everyone is born with creativity, it may not develop unless nurtured… But the truly creative mind will rise to prominence despite background or training… A guerrilla warrior is creative, but also destructive… To be creative and productive depends on being given the freedom to explore and being endlessly curious… I'm not sure if this can be 'taught'…

… Possibly, I'm not sure… The student must consciously want to improve and be prepared to change… Unless there is a latent 'change person' trapped inside waiting to be freed, I don't believe the 'Why not?' attitude can be imposed… It can only be encouraged if there is something there to begin with…

… Possibly, I'm not sure… I believe the ability to teach 'creativity' is limited by the skills, enthusiasm, knowledge, experience and willingness of those who are doing the teaching…

… Possibly, I'm not sure… I would prefer to know (if) there is a recipe (for creativity or creative teaching strategies)?

SECTION D: <u>OTHER COMMENTS AND FEEDBACK</u>

Question 20: *Any further observations, comments or attachments on creativity, design and/or education, especially in an Australian context?*

The final section on the questionnaire is optional. Question 20 provided an opportunity for respondents to volunteer any other commentary they feel adds to the qualitative feedback on creativity, design or education, particularly in an Australian context. Responses to this question are extremely generous and varied, with some critical reflection included. Responses freely range over many issues touched on previously and generally evidence and reinforce assumptions circulating within the community of practising designers about the nature and relevance of creativity in design and design education. In general the discussion deviates from creativity toward a much broader commentary on various design and design education issues. While the anecdotal information provided in Section D is pertinent in substantiating a contextual viewpoint, this question failed to solicit additional theoretical avenues or references relevant to pursuing a pedagogic interest in the research topic of 'Creativity: A Higher Order Capability'. Thirteen of forty eight respondent, or over one third of designers participating in the survey, offered no comment in Section D.

Further contributions offered by respondents to the qualitative survey include:

… Observation of environment – Landscape/vegetation/elements/colour/tones… Federation Square is an example of a mixture of elements, which I personally believe do not present a harmonious visual… Also in my opinion the stone-mix of colours of central Australia appear incongruous to our elegant city… However the colours are of central Australia and indigenous – Are they suitable?… (This is) a marvellous starting point for students (to contemplate) the 'aesthetic' (considerations presented by this design example)…

… The Business/Chamber of Commerce indicate a strong domestic market, and our $AUS and market is steady… I believe it is important for students to have an understanding and comprehension of current financial trends, and knowledge of business management… It is vital before entering small business to have these basic skills…

… There are no short answers to many of these questions… But it is important to understand that many practitioners work hard to survive in this industry and much harder to be good at what they do… My experience as a practitioner addressing matters of curriculum to various universities are that they are more focused on the activities that will generate revenue (for the institution) rather than seeking what is best for the student and the profession…

… (As a full time industrial design lecturer I am) not very well informed… I don't know (enough about design education) yet… but maybe that's a good thing… I am prepared to try an 'astute and better informed creative teaching strategy'…

… Recommended design reference: "Emotional Branding" by Marc Gobe, Allworld Press…

… Possibly there is a far greater respect for design and creativity in other countries, especially Europe… Australia tends to treat (design and creativity) as a commodity… We should have all our leading professionals lecture at university regularly… This didn't happen when I studied… The majority of lecturers were very out of touch and had never practiced in the 'real world'…

… There are limited financial resources to apply to education, and limited opportunities to make a real impact as a designer… Although I think the acceptance of design and its perceived value is improving and opportunities are greater (than in the past)… Therefore these resources should be more evenly distributed… Its not right that a few people squander the opportunity of others for personal gain in the current education system… I think you should look for practitioners that are alive and have been very successful. Compile a list (with) information about these people so if they are willing they can talk about their experiences to emerging designers… I think this would help students to understand the application of their technical skills…

… The value of being Australia and (having) knowledge of Australian design both past and present is not emphasised enough through our education system or our industry and tourism markets or even our retail industry… Education and marketing are the only way to emphasise this to all age groups, both in Australia or the rest of the world. Sit in on classes at a range of education faculties… Talk to the students after class… Show an overseas visitor around our cities… Listen to what they don't know about us and see what is offered … that is truly Australian product and experience… Our students now are the producers of domestic and world opinion of us for the future…

… Designers can be very introspective and often suffer from (inflated) self importance… thinking that they are the only people in the world with creative ideas… Creative problem solving is demonstrated in every facet of life… from basic day to day survival strategies of a mother with twins, to the highly funded and high profile work of NASA scientists… If you want to study creativity, go and meet and work with creative people… and I don't mean hip coffee shops and bars… Go to the labs, offices and workshops where people need to work hard and find solutions to problems all day every day… make sure it is a place where the creative ideas are actually tested and assessed (either functionally or in the marketplace)…

… Design evaluation is not valued nearly enough here (in Australia)… As consumers, I believe all students should learn about design to help it be valued in (Australian) society… I wonder what Italian or Scandinavian school kids have to design?

… I hate to be the one 'negative' response but design, in the present sense, is only about 10-20% of what interior designers do… It is the most important part however… I think many young designers are misled, therefore disillusioned, that they'll just be designing beautiful things they are proud of - nearly everyone has to do toilet blocks at some stage…

… I believe a basic understanding of principles of business, psychology and philosophy can improve the way in which design is presented to clients/end users for them to understand its potential benefits…

… Look at kindergarten kids' creativity and watch the decline from there on! Creativity is inherent in us all, it just gets educated out of us… Expectations of conforming and discipline takes over… Inhibitions are learned… Keeping our souls open enough to express (ourselves) is being creative…

… The act of creation is a very small component of the design process…

… Australians have total freedom to explore but… still suffer from cultural cringe… suffer a grave shortage of enlightened clients… work in a culture where design is undervalued and under identified… (where) it

doesn't pay to be a 'tall poppy'… Australia doesn't identify the myriad of small diamonds… only holds up a few icons of the industry…

… Greater awareness of what is happening overseas (in other) cultural contexts… Stimulating awareness of what is fundamentally Australian…

… Australia has a lot of creative talent… But design does not attract sufficient of them…

… I have always been a believer in getting out there and doing it… So I encourage working in real life situations as well as just formal teaching environments… Mixing work practice with education provides a good balance… I also think exposure to a range of disciplines is helpful, rather than restricting the student to a narrow area, so some cross-training is beneficial... Australia is a fantastic country… But it does tend to suffer from distance from 'where it is at' and a young history… Travel can only help broaden students' thinking, not only in terms of design as well as life experience… should be encouraged… Maybe by formal swaps with overseas students, or just enabling a break in a course to go see the world… My research is done primarily over the Internet… without it would take much longer to find solutions… I highly recommend students be familiar with this powerful information source, and subscribe to sites specific to their discipline…

… My favourite question to break away from stereotypes (is) 'What is the problem for which XYZ is a solution?' The blank would be filled with the assigned task – a house, a chair, a poster, a web site etc… When the blank was 'chair' it became possible to go beyond a conventional chair to the beanbag and the Norwegian HAG balans (kneeling chair)… Presumably you have carried out a literature search in the design field… You might look beyond design… For example, when reviewing assessment procedures we had conversations with ice skating and gymnastics judges who also have to judge performances with artistic and technical dimensions…

… Not really – Although if an Australian context is useful it would be elements such as the use of light, colour and space that could provide some of the elements of our Australian 'voice'… as could humour and pragmatism…

… Will it be an Australian contest only? I think we are all on the same boat regardless of the country… If creativity means free… freedom of being who you are and thinking as you want without being subject to existing values etc… The first words of a recently read book make me think what creativity is, is subjectivity. Recommended reference: "Shot by Shot Film Directing" by Steven D. Kitz.

… Take time each day to simply look around you….

… I wonder to what extent the cultural aspect is significant? Australia and Australians are well known for being innovators, for pushing the boundaries. I wonder if this affects both students and teachers? Although simplistic it does carry some truth – good teaching is good teaching. Recommended reference: Paul Ramsden's "Learning to Teaching in Higher Education" has a lot to offer.

… Simplicity and purity of forms = good design… Applicable to all forms… Subliminal/emotional experiences… in architecture = higher order creativity and discipline…

… I think in Australia, perhaps because of the whole 'tall poppy' view, that sometimes students (could) stand out much more, but they are afraid to do so… In England diversity is encouraged much more… Exhibitions are encouraged by the government… like '100% Design' plus others (when students finish their studies) are a chance to boost their chances of success outside the course…

… The Design and Technology syllabus (in NSW secondary schools) is excellent and affords students the opportunity to do great work, and enjoy rewarding study and career options in later life…

… The weighting of subjects in the HSC implicitly devalues the activities (such as design) which require hand and mind contributions…

… Australia needs to expose students to more local content and some more less-mainstream international content… I am sick of seeing the same design icons presented to students in lectures and books…

Conclusion:

This survey isolates some *'Key Aspects of Creativity for Teaching and Learning in Design Education'.* By circulating the questionnaire nationally to members and professional associates of the Design Institute of Australia views have been collected from within the community of practising designers in Australia about what is widely believed to be the nature and relevance of creativity in design education. The survey canvasses personal background, experience, beliefs, values and design practices in relation to creativity and its applicability to the teaching and learning of design. Interestingly a significant number of respondents also have either part time or full time experience working as design educators in addition to a wealth of expertise as professional design practitioners working in parallel industry sectors.

The qualitative feedback received from this representative sample of professional Australian designers, at differing career stages from entry level to mature practitioners of more than thirty years working across the breadth of the design industry, confirms that creativity is deemed to be 'essential' in design education. While there are many criteria equated with creativity, attitudinal factors are generally agreed to be most significant. Such factors include encouragement, freedom to explore and experiment, and receptiveness to change in both work and learning environments. On a personal and professional level this also requires intellectual and practical flexibility, coupled with a positive open mindedness, conviction that 'anything is possible', belief and confidence in oneself, valuing of creativity as a motivating force, high tolerance for ambiguity and an active interest in difference. Finally creativity calls for the ability to work collaboratively in groups and individual courage in the pursuit of unconventional design investigations and potentially new design solution, especially when faced with isolation, frustration, even temporary failure or ridicule.

Precisely 'how' such attitudinal and other contextual factors may be addressed in 'astute and better informed creative teaching strategies' is less clearly articulated by respondents. One often reiterated recommendation is that both teachers and students of design need to maintain meaningful interaction with 'real world' designers, clients, projects and the differing permutations of design practice in industry. Heightened observation, cultural awareness and participation in authentic aspects of the design world, and life in general, are thought to help students come to understand the role of design in society and the pragmatic realities of 'working' as a designer. For the professional designer a full range of professional capabilities involving sophisticated design knowledge, skills and attitudes, including creativity, must be readily on call to service of clients in a commercial business capacity.

The qualitative data resulting from this practitioner survey evidences pre-understandings about creativity and design education circulating in the design world. This information substantiates the relevance of the preliminary assumptions underpinning subsequent research into 'Creativity: a Higher Order Capability'.

Copy of survey instrument follows: As approved by the UTS Human Research Ethics Committee 17 April 2002 and circulated to members of the peak Australian industry association for the design profession via the email network of the Design Institute of Australia in the latter half of 2002.

Research Centre for
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R C V E T

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Broadway NSW 2007
Australia

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Fax: (02) 9514 3737
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U|T|S|

University of Technology, Sydney

Members of the Design Institute of Australia   3 June 2002
196 Flinders Street, Melbourne VIC 3000

Dear DIA members:

In support of research into the nature and role of creativity in design practice and design education, the Design Institute of Australia has kindly agreed to circulate the following short survey to members via the email. DIA distribution of the survey in no way implies DIA involvement in either the content or analysis of the data obtained, however the aggregated results of the survey can be made available to DIA if requested.

My name is Robyn Tudor. I am a DIA member and design educator engaged in Doctor of Education (EdD) studies at the University of Technology Sydney (UTS). I have adopted a qualitative approach to researching the topic 'Creativity – A Higher Order Capability' in the context of design education. Professor Paul Hager is supervising this EdD research in the UTS Faculty of Education. The purpose of this email survey is to establish the prevailing views of Australian design practitioners about the nature of creativity, its perceived importance and its role and relevance in design education, in an attempt to isolate the 'Key Aspects of Creativity for Teaching and Learning in Design Education'.

As a DIA member, you are invited to contribute your views about creativity and design education by completing the attached 20 question survey including,
- 10 closed contextual questions
- 6 inductive short answer questions seeking brief interpretive responses
- 3 reflective short answer questions asking for professional opinions
- 1 question inviting observations, comments or recommendations.

You are asked to share your professional opinion and experience of creativity in relation to design practice and education in your field of expertise. The survey gives you the opportunity to offer your insights and judgements regarding what might be considered one of the most fundamental issues for professional designers – how to marshal creativity in oneself and especially in others. As a practising designer, it is anticipated that you can draw on first hand professional experience to provide an informed 'meta-perspective' on the complex challenge presented by creativity. While this is a hot topic of debate in the UK at present, it is important to establish the viewpoint of Australian designers. Hence, your frank, anonymous and prompt responses to the survey will be invaluable in advancing this research. To facilitate your ease of participation, you may print the attached file as a survey document in WORD to be completed by hand. Alternatively you may prefer to copy the file to your computer desktop to fill in on screen and then print. In both cases please post <u>completed hard copy survey</u> to,
> **ROBYN TUDOR**: EdD Research
> C/- Professor Paul Hager (Supervisor)
> Faculty of Education, University of Technology Sydney
> PO Box 123 Broadway NSW 2007

Thank you for your time and co-operation - Robyn Tudor MDIA (Ed)

Please NOTE: The University of Technology, Sydney Human Research Ethics Committee has approved this study. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer, Ms Susanna Davis (ph: 02 - 9514 1279, Susanna.Davis@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

EdD SURVEY INSTRUMENT:

**'*Key Aspects of Creativity for Teaching & Learning in
Design Education*'**

Introduction

This survey will contribute to Doctor of Education (EdD) research into the nature and role of creativity in Design Education. The thesis is titled *'CREATIVITY – A Higher Order Capability'*. The research seeks to improve teaching practice in design education by focusing on creativity as one of the most critical factors in successful teaching and learning in design.

In particular the survey responses will be used to examine the question,

"How can creativity be made teachable in Design Education?"

The survey seeks your personal views in relation to your primary area of expertise. There are 20 quick response or short answer questions, intended to take under **half an hour** to complete.

The survey is organised in four sections targeting different sorts of data,
Section A asks for indicative contextual information about the respondent.
Section B asks for a degree of interpretive information. Here you are free to respond to whatever extent you consider appropriate.
Section C asks for some reflective information and opinion.
Section D provides opportunity for further comment, attachments or recommendations, which are very welcome.

Your feedback as a practising professional is very important to provide an Australian perspective for this research. I wish to thank you in advance for your time and co-operation and encourage you to circulate the survey to students or other professional designers if appropriate. Please complete the survey on screen or hard copy and return it immediately or as soon as possible.

Survey Instructions: As follows **a) print, write & post** *OR* **b) copy/type, print & post**

a) Print out the blank survey from this WORD document attachment, fill it in by hand and post to the return address below.
b) Alternatively you may prefer to save the WORD document as a file on your computer desktop. To complete survey on screen type your responses over the line spaces after each question, replacing the selected **O** with an "**X**" to indicate your responses. Then print and post to the return address below.

Once the survey is complete, to satisfy UTS requirements please post the hard copy to,
        Robyn Tudor: EdD Research
        C/- Professor Paul Hager (Supervisor)
        Faculty of Education
        University of Technology Sydney
        Box 123 Broadway NSW 2007

PLEASE NOTE: This survey is circulated with the kind co-operation of the Design Institute of Australia national office. The survey instrument in no way reflects the views or priorities of the DIA executive. The information obtained from individual responses to this survey is for academic research purposes only and will remain strictly confidential. Reporting of survey results will be aggregated and all comments will be reported anonymously.

THANK YOU – *Robyn Tudor*

SURVEY QUESTIONS:

"Key Aspects of Creativity for Teaching & Learning in Design Education"

SECTION A: Contextual information (Please fill in the blanks or mark an **X** in/over one or more of the "**O**" circles)

1. Individual respondent characteristics:

    a) Job Title/Role:

    ……..

    ……

    b) Brief description of size and nature of design practice:

    ……

    ……

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    c) Brief explanation of type of workplace, clients and projects undertaken:

    ……

    ……

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    ……

    ……

    ……

2. Please indicate <u>one or more</u> primary areas of your professional interest/expertise/responsibility:

DESIGN	ART	TEACHING
O Architecture	**O** Fine Arts	**O** **School/Community Ed.**
O Digital Design	**O** Media Arts	Please specify organisation type: ……………………………………..
O Engineering Design	**O** Applied Arts/Craft	Please specify subject(s): ……………………………………..
O Fashion Design	**O** Other specialist area	……………………………………..
O Film, TV, Video	Please specify areas(s) of expertise: ………………………………….	Please specify course/level/years: ……………………………………..
O Graphic Design	…………………………………	**O** **Vocational Education**
O Industrial Design	…………………………………	Please specify type of provider:
	…………………………………	**O** TAFE
O Interior Design	…………………………………..	**O** Private College
O Jewellery Design	………………………………….	Please specify course(s):
	…………………………………	……………………………………..
O Multimedia	…………………………………..	……………………………………..
O Product Design	…………………………………..	**O** **Higher Education**
O Textiles Design	………………………………….	Please specify faculty/school:
	…………………………………..	……………………………………..
O Visual Communication	…………………………………...	.Please specify course(s): ………
O Other, please specify: ……...	.…………………………………	.……………………………………
……………………………………..	.…………………………………..	……………………………………..
……………………………………..	.…………………………………..	……………………………………..

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3. How many years of professional design and/or teaching experience do you have?

O 1-10 years   **O** 10-20 years   **O** 20-30 years   **O** More than 30 years

Briefly describe scope of experience: …………………………………………………………………

……………………………………………………………………………………………………..

……

4. What is the highest level qualification you hold?

O Certificate   **O** Diploma   **O** Degree   **O** Postgraduate Degree

State your qualification title(s) with specialisation (optional):

……………………………………………………………………………………………………..

5. On a priority scale of 1-5, how would you rate the importance of stimulating creativity in students studying in design education courses?

O 1:   *Essential*

O 2:   *Critically important*

O 3:   *Moderately important*

O 4:   *Minimally important*

O 5:   *Not important*

6. Do you believe you have a good understanding of what constitutes creativity in your field of expertise?

O Yes, definitely   **O** Yes, to a point   **O** No, not really   **O** Definitely not

7. In general terms, how would you tend to characterise creativity in your field?

O Creativity = Problem-solving

O Creativity = Innovation or adaptation within known/specified parameters

O Creativity = Originality or inventiveness in new or unfamiliar contexts

O Creativity = Individual expression or personal statement

O Creativity = Innate talent or genius

O Creativity = Generating ideas using specific techniques (e.g. Brainstorming)

O Creativity = Opportunistic novelty, cleverness or deviousness

O Creativity = Intuitive, smart or sharp practice

O Creativity = Strategic entrepreneurship or original research

O Creativity = …………………………………………………………………………………

---

8. Do you think that creativity operates in the same way or differently in various design disciplines?

    O Same   **O** Differently   **O** It depends   **O** Not sure

    Please explain: ……………………………………………………………………………………………
    ………
    ………
    ………
    ………

9. Amongst your colleagues, how frequently discussed and enacted are views about creativity?

    O Constantly/routinely   **O** Periodically   **O** Rarely   **O** Never

10. What has been most significant in shaping or changing your views about the nature and importance of creativity?

    O My teachers   **O** My employer(s)   **O** My design colleagues/peers   **O** Other factors

    Please explain: …………………………………………………………………………………………..
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    Please proceed to answer questions 11-16 in Section B following.

SECTION B: Interpretive information (Please write/type answer under each question, continuing on the back of the page or additional pages if required.)

11. How would you generally describe the creative activities or work practices you use in your field to generate design ideas?

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12. Relatively speaking, what part do you think *KNOWLEDGE, SKILLS or ATTITUDES* play in creativity?

a) **KNOWLEDGE:**……………………………………………………………………………………………

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b) **SKILLS:**…………………………………………………………………………………………………

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c) **ATTITUDES:** …………………………………………………………………………………………

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13. What *BELIEFS* or other factors do you think <u>inhibit</u> creativity?

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14. What *BELIEFS* or other factors do you think <u>promote</u> creativity?

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15. What specific ***PROFESSIONAL STRATEGIES*** are used to purposefully increase/enhance creative design outcomes in your design field or workplace?

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16. In your experience and/or opinion,

   a) What 'implicit' or 'explicit' ***CREATIVE TEACHING STRATEGIES*** might help to overtly improve creative results and student confidence in the classroom?

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   b) Do you think such strategies can be identified and intentionally applied in terms of course structure, curriculum content, training package development or teacher training in your specialist area? If so how? If not why not?

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Please proceed to answer questions 17-19 in Section C following.

SECTION C: Theoretical information (Please write/type answer under each question, continuing on the back of the page or additional pages if required.)

17. What particularly significant personal or professional experiences influenced your views about creativity?

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……
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……...

18. What particular practitioners, authors, theories or texts informed your views about creativity?

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……
……
……

19. Do you believe creativity can be improved by astute and better-informed creative teaching strategies?

O Yes   **O** No   **O** Possibly, I'm not sure

If so, how?   If not, why?   Please explain?

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__Please proceed to question 20 to complete the survey in Section D following__.

SECTION D:

20. Any further observations, comments or attachments on creativity, design and/or education, especially in an Australian context?

………

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Optional: Please indicate any discipline specific information sources or references you would recommend to enhance the professional relevance of this research:

………

………

………

………

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………

THANK YOU FOR YOUR TIME AND PARTICIPATION – *Robyn Tudor (MDIA Ed).*

If appropriate, please feel free to encourage your professional colleagues in design or your students to also participate in this research by completing the survey and forwarding their responses as follows.

PLEASE RETURN YOUR COMPLETED SURVEY BY POST TO:

ROBYN TUDOR: EdD Research

C/- Professor Paul Hager (Supervisor)

Faculty of Education

University of Technology Sydney

P.O. Box 123 Broadway NSW 2007.

Appendix 2: <u>OVERVIEW OF PROFESSIONAL DESIGN EDUCATION IN AUSTRALIA</u>

LOCATING CREATIVE CAPABILITY:

RELATIVE TO DESIGN COMPETENCY & DESIGN PRACTICE

In Australia, as in most Western countries, institutional design education is offered in schools, at vocational colleges, in universities and other higher education institutions. However the pedagogical principles and priorities governing the delivery of design education differs across the sectors. These differences relate to teaching and learning emphases, to the depth and breadth of content engagement and application, and to the degree of student autonomy or responsibility for the performance of self and other learners. Eligibility for award of particular qualifications is assessed against achievement of designated outcomes of learning that are judged in line with the requirements for progression into further training, higher education and/or professional employment in industry.

The Australian Qualification Framework (AQF) governs the Australian education system from senior secondary school to postgraduate doctoral level. With some minor internal variation, this mandatory national framework aligns competencies or capabilities against specific levels of qualification including AQF Certificates I-IV, Diplomas, Advanced Diplomas, Associate and Bachelor Degrees, Graduate Certificates and Diplomas, Masters and Doctoral Degrees. Responding to differing sector priorities, all design education in Australia nevertheless strives to cover a cycle of broadly coherent teaching and learning in design including discipline specific:
- processes and practices
- attitudes
- skills and abilities
- application
- context
- theory

Within an increasingly instrumental competency based philosophy of education and training, school and vocational design courses in Australia generally tend to give higher priority to developing applied knowledge and skills in practical design processes and practices. This is intended to build students' technical competencies, production abilities and vocational preparedness for the world of work. Undergraduate and postgraduate higher education design courses also provide learners with the necessary enabling practical competencies albeit delivered in conjunction with heightened project complexity and academic challenges. University design programs tend to justify higher academic standing and qualifications in terms of expansive and specialised professional design applications, critically heightened social and cultural consciousness and commensurate levels of engagement with relevant theoretical design issues and research.

A key element in ongoing pedagogic debates in Australia and elsewhere involves efforts to differentiate narrow notions of 'competency' from expansive characterisations of professional 'capability', especially in the designation and delivery of design knowledge,

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skills and attitudes. The international call for increased enterprise and innovation brings the question of creativity into sharp focus. In terms of knowledge, skills and attitudes, it is argued in this thesis that creative capability relies primarily on the cultivation of generative attitudes and productive (rather than reproductive) values. This qualitative aspect of design education is essential at all AQF levels. Attitudinal commitment provides the all-important stimulus and motivation for individual engagement with design learning and collective development of embodied sense knowledge, visual and intellectual discernment, and critical judgement. These emotionally oriented attributes underpin the quality of practical knowledge and skill acquisition needed to participate in meaningful design action as design students, as design teachers and as design practitioners throughout life.

The following Iterative Model of Professional Design Education (Figure A2:1) locates creativity not in terms of a simplistic and unhelpful binary opposition of competency vs. capability. Rather it describes a cycle of holistic understanding in design education where various considerations all contribute to a continuum of design outcomes that diverge according to competing and coalescing priorities in the professional environment. Central amongst these considerations are the design attitudes upon which creative capability and innovation rely. The Iterative Model of Professional Design Education is provided in Appendix 2 to assist readers, who may be unfamiliar with the AQF. It illustrates how a holistic focus on creativity and design attitudes need not necessarily be predicated upon any one or other sector of design education or particular qualification level offered in Australia.

Ideological forces that would drive a wedge to separate design competencies from creative capabilities are counterproductive to innovative design practise and education in all sectors. It is not a matter of either/or, since both specific competencies and broadly based capabilities are necessary in design practice. Rather, what is required across the entire AQF spectrum of design education and training qualifications in Australia is much closer pedagogical attention to finding ways and means of enriching design attitudes and cultivating holistic motivational beliefs and values. Where design competencies and capabilities combine to generate creatively motivated professional design action in students this has the potential to be genuinely meaningful, productive and sustainable for individual learners and professional design and design education communities at local, national and international levels, now and into the future.

Pedagogical success of design education, may depend less on what prescribed content, processes and practices students are taught, than on how well students learn to integrate the holistic design experience of actively 'being creative' using the specific knowledge and skills available to them at any given time. The merits of an attitudinally focused pedagogical perspective relate equally to all AQF levels of design education in Australia. It also accords with a much more widespread international move advancing the qualitative principles of 'values based education' across all areas of teaching and learning.

Figure A2:1 ITERATIVE MODEL OF PROFESSIONAL DESIGN EDUCATION LOCATING CREATIVE CAPABILITY RELATIVE TO DESIGN COMPETENCIES & DESIGN PRACTICE

DESIGN PRACTICE:

EDUCATION PRACTICE:

HIGHER EDUCATION

| **AQF** |
| PhD |
| Masters |
| Graduate Diploma |
| Graduate Certificate |
| Bachelor |
| Associate Degree |

POST GRADUATE

UNDERGRADUATE

BUSINESS/COMMERCIAL COMPETENCY
Knowing what, how much & at what $cost.

SOCIAL/CULTURAL COMPETENCY
Knowing where, when & for what purpose

PHILOSOPHICAL/ANALYTICAL COMPETENCY
Asking why, knowing that
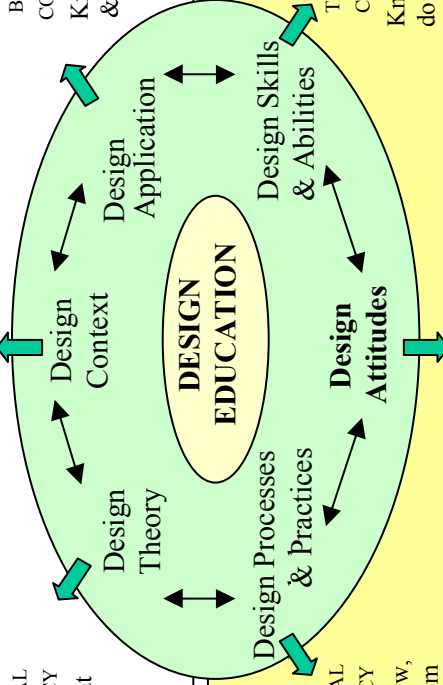
APPLIED PRACTICAL COMPETENCY
Know-how, professional expertise and practical wisdom

Design Application

Design Skills & Abilities

Design Context

DESIGN EDUCATION

Design Attitudes

Design Theory

Design Processes & Practices

VOCATIONAL EDUCATION

TECHNICAL COMPETENCY
Knowing how to produce, doing/making/practising

TRADE/Training

SCHOOLS/VET

| Adv Dip |
| Diploma |
| Cert IV |
| Cert III |
| Cert II |
| Cert I |

EMBODIED HOLISTIC LEARNING INNOVATIVE COMPETENCY CREATIVE 'CAPABILITY' DESIGN EDUCATION PRACTICE

Embodied sense knowledge - questing for motivation, substantiation, legitimization and integration of other design and experiential knowledge(s), and skills involving discernment, critical judgement and design action
for
VOLUNTARY INDUCTION INTO COMMUNITY OF PRACTISING DESIGNERS

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