EXPLORING THE HIDDEN POWER OF WORLDVIEWS

A new learning framework to advance the transformative agenda of Education for Sustainable Development

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Certificate of original authorship

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 part of the collaborative doctoral degree and/or fully acknowledged within the text.

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List of contributions

Journal publications

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Conference papers

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- De la Sienra, E., Smith, T. & Mitchell, C. 2017, 'Unlocking the hidden power of worldviews: a new opportunity for the transformative education for sustainable development', Session: Education for Sustainable Development: An issue of consciousness and values, paper presented to the Fifth Annual International Conference on Sustainable Development. New York, United States of America.

Conference presentations

- De la Sienra, E., Smith, T. & Mitchell, C. 2015, 'An integrated learning model to self-recognise and transform worldviews and behaviours. Session: Values in place: The interior dimension of sustainability', presentation to Culture(s) in

Sustainable Futures: Theories, Policies and Practices. European Cooperation in Science and Technology. University of Jyvaskyla. Helsinki, Finland.

- De la Sienra, E., Smith, T. & Mitchell, C. 2016, 'Worldviews as virtual realities hiding the potential of human behaviour: A fundamental construct for the fulfilment of the goals of the Education for Sustainable Development. Session: Educating for change', presentation to Global Ecologies – Local Impacts. University of Sydney, Australia.

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Table of Contents

List of figures

List of tables

List of abbreviations

CGT Constructivist Grounded Theory
ESD Education for Sustainable Development
IBDM Interpersonal Biology of the Developing Mind
TFWB Transdisciplinary Framework on Worldviews and Behaviours
WBLF Worldviews Based Learning Framework

Abstract

The field of Education for Sustainable Development (ESD) is evolving from a positivist orientation dominated by the connection between knowledge and behaviour, to a range of more integrated approaches aiming at introspection and the deep transformation of the self. A transdisciplinary literature review covering neurological, cognitive, affective, psychological and philosophical aspects of human behaviour, as well as theories of learning and educational paradigms unveiled *worldviews* as a useful term to build a new approach to learning, potentially helpful in the achievement of ESD's transformative goals.

A *worldview* is a complex constellation of meaning from which the wide range of human conduct emerges; it is the uniquely personal, subjective meaning given to reality, which explains each life experience and prescribes patterns of emotions, thoughts and actions. The concept was used to explore how people apprehend and make sense of their own reality, and form their unique structures of meaning. This investigation explored the potential of worldviews in both a theoretical and empirical manner. The Transdisciplinary Framework on Worldviews and Behaviours (TFWB) was developed as a theoretical explanation of what worldviews are and how they are mentally formed and physically expressed through the wide range of human conduct the body can display. Then, building upon the TFWB, an in-depth qualitative study of the personal worldviews was designed and implemented to gain insights into the actual experience people have of their own worldview and how it is formed and transformed.

Twenty-five randomly selected participants' worldviews were explored in three steps. Initially, the participants completed an online multiple-choice survey based on a worldviews typology and questionnaire focused on the identification of ontological, epistemological, axiological, anthropological and sociological perceptions. Then, they participated in a semi-structured interview where they discussed their responses to the questionnaire, the most significant life experiences they identified as being crucial

in the formation of their worldview, and behaviours which they identified as representative expressions of their worldview. Follow-up questions administered two months later provided an opportunity to prompt and capture insights and reflections arising from the experience of the interviews. Based on a Constructivist Grounded Theory (CGT) approach, data was analysed through specifically tailored interpretive frameworks; for example, to analyse coded data regarding life experiences, a specific interpretive framework integrating premises on worldviews, learning, and psychological influences in mental development, was developed.

The empirical research revealed a general struggle among the participants to recognise their own worldview, how it is formed and how it determines the way they behave. Participants showed inconsistency and variations in their capacity to self-recognise, critically reflect and eloquently express themselves. Reported significant life experiences like moving into a new country, getting married or the death of a relative suggest that, for this group at least, traditional education approaches have not played a significant role in the recognition of these fundamental issues about human identity and existential meanings. Self-recognising a personal worldview resembled the first five phases of a transformative learning experience, with the potential to encourage reformulations in meaning structures and increase coherence in personal narratives; in turn, this includes the inherent opportunity to explore new ways of being, becoming and behaving.

Based on the empirical results and the theoretical TFWB, this thesis concludes with a distillation from the findings into five learning principles integrated into a worldviews based learning framework (WBLF), which would make a difference to ESD. This study argues that transformative ESD needs new foundations that position worldviews at the centre of the learning and transformation process. Such an approach would improve people's self-recognition of how and when they sense and apprehend the world, and build its meanings; and how such meanings determine the ways people feel, think and act, contributing to the achievement of ESD's transformative goals.

Graphical abstract

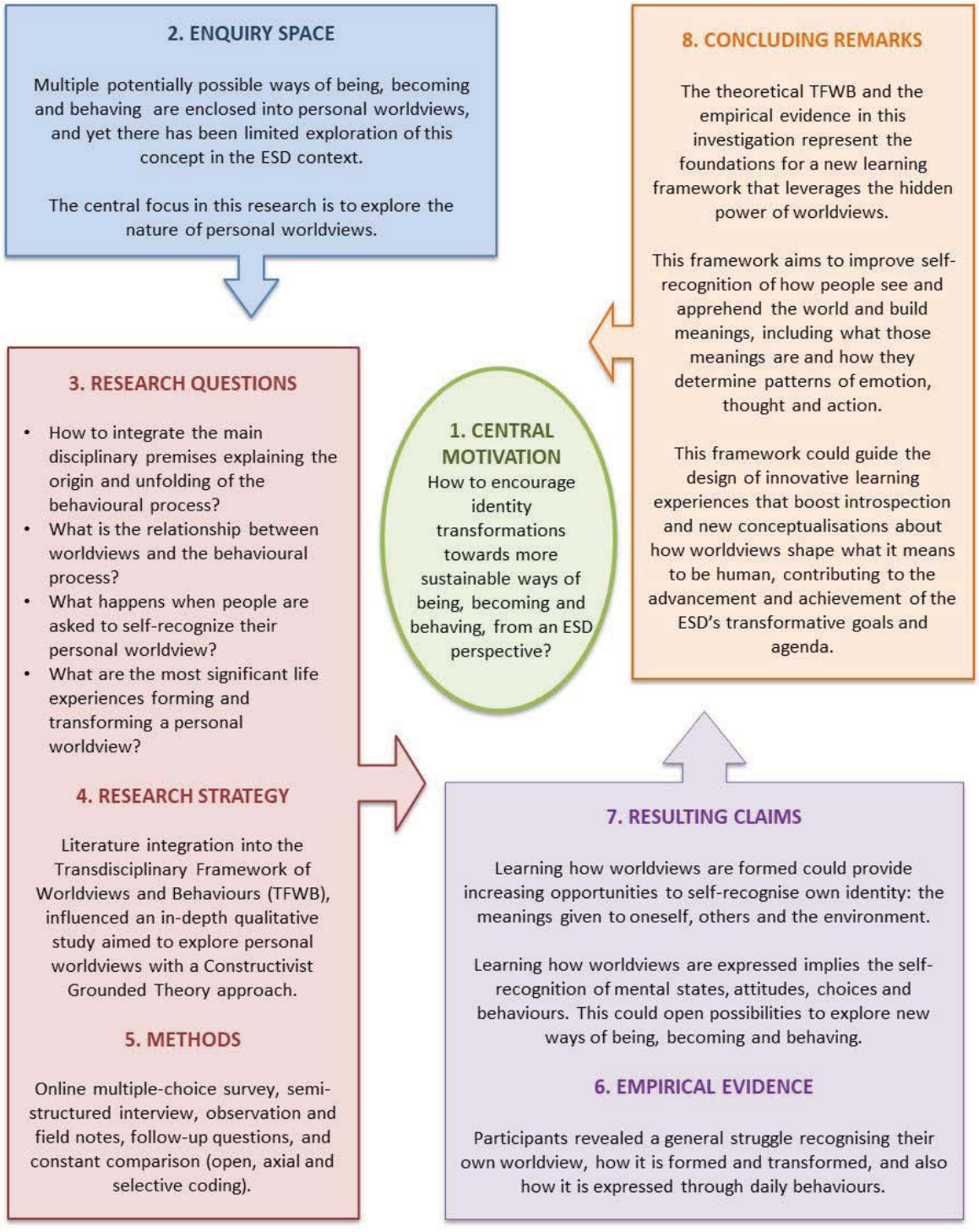

Figure 1. Graphical abstract based on Hammersley's research framework (Hammersley 1998) adapted by Hopwood (Hopwood 2014).

CHAPTER ONE: Introduction

'Yesterday I was clever so I wanted to change the world.
Today I am wise, so I am changing myself'
Jalaluddin Rumi

The field of Education for Sustainable Development (ESD) has always had transformative goals, but it has not always had transformative processes (Stevenson 2013). The initial motivation behind this doctoral journey was to identify new educational pathways to encourage individual and collective transformation towards more sustainable ways of being, becoming and behaving. In response to the transformative call from the ESD research and practice community, the overall purpose of this research was to explore what shapes the way people are on a daily basis. As will be observed throughout this thesis, the fundamental premise shaping this investigation is that becoming more aware of the underlying meanings given to reality is what actually increases opportunities for a more sustainable existence.

This research provides significant contributions in two dimensions. Firstly, it presents the Transdisciplinary Framework on Worldviews and Behaviours (TFWB), strengthening the argument for taking worldviews as a focal learning point for transformation. The framework provides for the first time a scaffold for positioning insights on the human experience from diverse disciplines in relation to each other, in the dimension of academic research. In so doing, the TFWB offers guidance on what constitutes a worldview, emphasising what might be transformed and how. Secondly, this research explores the empirical implementation (use or value) of the TFWB, holding great promise as a trigger for transformative learning experiences that encourage introspection and re-conceptualisation of the meaning of being a human. Such learning experiences could ultimately contribute to the potential transformation of patterns of

emotions, thoughts and behaviours of individuals, towards a more sustainable existence.

The theoretical and empirical transdisciplinary findings were integrated into a foundational learning framework based on a worldviews approach. This ultimate outcome aims to guide innovative ways to design and deliver learning experiences, where people are able to explore, identify, adjust or remake some of the meanings they have given to their own reality. This contribution aims to support the achievement of the transformative agenda, goals and processes of ESD.

This first chapter provides the general context and describes the nature of the enquiry space of this research project. The text commences with a brief analysis of the new challenges and opportunities in the field of ESD and sets the scene for the contribution of this work. Then, the research questions are introduced, leading to a brief overview of the qualitative methodological design. Finally, this chapter outlines the thematic organisation of the thesis, and a brief articulation of the main contributions of the work.

1.1 The enquiry space: new challenges and opportunities in the field of Education for Sustainable Development (ESD)

This section briefly reviews how ESD has been conceptualised over time in the international sphere. In particular, this section describes the three shifts in perspective on the contribution of education to addressing the challenge of sustainability. This text provides insight into the broad historical context framing the enquiry space, and positions this thesis at the leading edge of the current shift in approaches to ESD.

At its origin, ESD was referred to as Environmental Education (EE), and was based on the assumption that improving the relationship between people and the environment required more knowledge about the environment. Principle 19 of the Declaration of

the United Nations Conference on the Human Environment, held in Stockholm, Sweden, in 1972, represents this assumption by establishing:

> *Education in environmental matters … is essential in order to broaden the basis for an enlightened opinion and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimension… (United Nations 1972)*

The emphasis was placed on the logical rationale of an informed opinion translating by default into informed and sustainable behaviours. Locally, EE emerged as a process that allowed individuals to recognise the exploitation, overexploitation, pollution and general degradation of ecosystems by human activities. With the immediate preservation of biodiversity as its ultimate goal, EE aimed to engage people in solving environmental problems by developing skills to make informed decisions and take action to improve the health of ecosystems (Saylan 2011; Tilbury 1995; Weston 1996). Naturalists, biologists and ecologists increased societal knowledge of the delicate ecological balance, encouraging the engagement of civil society in green politics and regulations (Stevenson 2013; Wals 2013).

After two decades, the goal of EE shifted from learning exclusively about how to protect nature towards finding a more balanced model of development, within the limits of the Earth's boundaries. This was reflected in the 1992 United Nations Conference on Environment and Development, also known as the Earth Summit, held in Rio de Janeiro, Brazil, where the first shift in the conceptualisation of environmental education became evident. Governments were encouraged to rethink economic and social progress in the context of the ecological capacity of the planet, focusing more on creating new strategies for sustainable development rather than restoring and protecting nature and its ecological balance. The term *Education for Sustainable Development (ESD)* was officially established, and Agenda 21 defined the goal of ESD as an integration of the key sustainable development issues into teaching and learning at all levels (United Nations 1992). Some of the priority topics were causes of climate

change, disaster risk reduction, adaptation, poverty reduction, and sustainable consumption of goods and services (United Nations 1992). ESD aimed to complement the ecological and conservationist approach of EE as described above, with the imperative to recognise and change unsustainable human activities. The goal was not only to learn about the ecological crises and how to protect nature but also to find alternative forms of economic and social growth within the planet's carrying capacity (Yue 2013).

The following two decades witnessed a wide expansion of ESD across the world; policymakers, researchers, practitioners and all sectors of society formed multi- and interdisciplinary groups which aimed to implement their particular conceptualisation of ESD (Dale 2005; Jackson 2011; Vare 2007). A wide spectrum of diverse ESD activities, plans and strategies became visible in primary, secondary, tertiary and non-formal educational systems around the world (Dale 2005). Key international events like the World Summit on Sustainable Development in 2002, the United Nations Decade for ESD (2005–2015), and the United Nations Conference on Sustainable Development in 2012 reaffirmed the initial goals of ESD and continued to foster the implementation of the ESD agenda all over the world (UNESCO 2005; United Nations Educational 2013).

In retrospect, it could be argued that ESD has been fruitful in raising awareness about the need to change, but it has not been successful enough in making that change happen (Stables 2013, p. 184). As a direct outcome of the last four decades of global, national and local efforts, today it is possible to observe a widespread knowledge of the problems humanity is facing; with a predominant understanding of what is sustainable development, and what are some of the most important changes that need to be implemented across all sectors and scales of society (UNESCO 2012). Despite this progress, the pace of environmental destruction, including both the social and natural dimensions, is increasing '*at an alarmingly accelerating rate*' (Saylan 2011, p. 1). The abrogation of responsibility, evasion of reality, lack of long-term commitment, individual and collective inability to take action and change, and overall

continuity of unsustainable ways of social and economic growth still dominate the global, national and local scenarios (Sachs 2014a; Sachs 2014b). Until recently, ESD has focused primarily on the analysis of how individuals and communities manage the environment, without exploring further what are the underlying dominant meanings that have been historically attributed to those three concepts and their interactions.

After the conclusion of the United Nations Decade for ESD (2005–2015), a third educational shift towards a transformative agenda is becoming apparent. In January 2016, the international ESD community, with support from the United Nations, held a conference titled Education as a Driver for the Sustainable Development Goals, decreeing the Ahmedabad Plan of Action (UNESCO 2016). In this policy, hundreds of ESD researchers, practitioners and policymakers recognised that the transformation required by the agreed upon Sustainable Development Goals (United Nations 2015) will require an in-depth rethinking of education itself.

The need to reconceptualise education was specifically acknowledged through the following statement:

> *Dominant education systems have tended to impose a narrow conception of rationality at the expense of emotional understanding, learning acquired through life's experiences and traditional knowledge systems. Additionally, the transformative education that is now called for is not amenable to easily defined outcomes or measurement. Education must be reconceived in a way that allows space for diverse ways of knowing and new ways of being and becoming that reflect inclusivity in the true sense of the term. (UNESCO 2016)*

The third shift in the global conceptualisation of ESD involved a deep transformative approach where the focus is no longer on the knowledge or willingness required to change human activities and behaviours, but on the inner exploration of the multiple determinants shaping the diverse human identity. Emotional understanding, the role of life experiences, and the identification and inclusion of diverse ways of being are the

new priorities in ESD, as explained above in the quote from the Ahmedabad Plan of Action (UNESCO 2016).

Attention is placed now on the inherent and exclusively human feature that is to build, change and transform the meaning of any experience at any time – consequently determining new patterns of emotion, thought and action derived from such meaning (Jackson 2011; Stevenson 2013). At this moment in human history, it is becoming more recognised that improving the relationship between humankind and the Earth's systems is dependent on our ability to first explore new possible meanings of the human condition (UNESCO 2016).

Looking ahead, in September 2017, the next United Nations conference focusing on matters of sustainable development already includes a specific section called Education for Sustainable Development: An Issue of Consciousness and Values. It is expected that researchers and practitioners in the field of ESD will discuss how to innovate and facilitate individual and collective transformation towards more sustainable ways of being, becoming and behaving. This is where the general context of the new challenges and opportunities in the field of ESD frame the particular nature of the enquiry space in which this thesis is placed.

Efforts to advance and accelerate the transformative agenda of ESD have recently begun to surface across different disciplines and approaches. Part of this work discusses the influence of worldviews on human conduct and places a special focus on the capacity to discern and favour sustainable behaviours (Aitken 1988; Devlin 2010; Harraway 2012; Hedlund-de Witt 2012, 2014b, 2014a; Hurst 2013; Macy 2007, 2012; O'Brien 2013a; O'Brien 2013b; Patel 2008; Schein 2015; Schlitz 2010; Sharma 2007; Van Opstal 2013). More specifically, some of the increasing interest in worldviews relates to the quest to understand how this mental construct encloses the '*hidden power*' to break through existing limitations regarding the achievement of more sustainable ways of being (Schein 2015).

In this context, this research addresses the need for a fuller comprehension of how worldviews are formed, transformed and expressed. This understanding could eventually help present and future generations to engage in long-lasting transformation of unsustainable patterns of emotions, thoughts and actions, by addressing some of our most ingrained filters (Hedlund-de Witt 2014a, 2016b; Schein 2015; Sharma 2007). Thus, this doctoral research explores what worldviews are and how they relate to our ways of behaving, becoming and being, in order to identify the role worldviews could play in advancing the transformative agenda of ESD.

The main interest guiding this research journey was around what shapes the wide range of behaviours people express on a daily basis. This thesis presents an analysis of the latest discussions about the challenges that ESD faces today, and how those challenges could be addressed, revealing that there is a vast amount of disarticulated theories about learning. A further analysis of cognition, intelligence and learning exposed the term *worldview* as a promising concept, unveiling a potential source of answers and integration about how people sense, apprehend and give meaning to the world. The literature review of this research is presented in *Chapter 2: Exploring the broader and deeper context of Education for Sustainable Development*. The next section of this chapter describes the research questions that emerged from this literature review and the methodology that was designed to explore potential answers to those research questions.

1.2 Research questions and methodological design

The initial motivation defining this research was to explore how to achieve better outcomes as an ESD facilitator. Knowledge and willingness among people seemed to not be enough; so this investigation explored further what is shaping the way people are and the way they behave on a daily basis (beyond knowledge and willingness).

Two dominant educational paradigms about how to teach and how to shape human behaviour were identified within both ESD and the broader educational discourse. One is fundamentally based on forming and training, somehow dictating, even imposing, specific behaviours from the individual's external environment (Bell 2016; Freire 1999; Orr 1991; Saylan 2011; Stevenson 2013; Teeroovengadum 2012). The other focuses on encouraging the natural emergence of specific conducts from within the person's core of subjective meaning (Bass 2004; Duff 2003; Ergas 2013; Mahmoudi 2012; Morgan 2013b; Morin 1999; Nicolescu 2005; Roeser 2009; Weston 1996). These two paradigms have been historically disjointed, and this research aimed to explore its potential integration.

Another dichotomy of behavioural approaches exists between the neurological and anatomical explanations of cerebral and neural functioning, and the disjointed and diverse psychological and philosophical perspectives on meaning-making (these are discussed in detail in Chapter 2). Despite the differences detected among all these disciplinary premises, areas of overlap emerged. The intention to explore possible integration of the premises, and to create a more holistic explanation of the behavioural process, led to the formulation of the first research question:

> **How can the main disciplinary premises explaining the origin and unfolding of the behavioural process be integrated?**

The second educational paradigm mentioned above, raised in itself other interrogatives about how people sense and apprehend the world, and give meaning to their own reality. Consequently, the vast and disjointed literature on human learning, cognition and intelligence was explored. It emerged that some premises overlap. In this case, the term *worldview* – particularly the specific definition provided by Hedlund-de Witt (2014) – surfaced as a possible point of theoretical convergence (Hedlund-de Witt 2014b, 2014a). According to her work, a worldview is the '*inescapable, overarching systems of meaning and meaning-making which substantially inform how humans interpret, enact, and co-create reality*' (Hedlund-de

Witt 2014b, pp. 40-1), consisting of foundational perceptions '*regarding the underlying nature of reality, proper social relations or guidelines for living, or the existence or non-existence of important entities*' (Hedlund-de Witt 2014a, p. 8315). This definition presented an opportunity to compare:

a) multiple explanations about what perceptions are and how they are formed and transformed (according to anatomical, neurological, cognitive, psychological and philosophical arguments)
b) multiple arguments about how being able to build and give specific (and interchangeable) meaning to our everyday experiences is what distinguishes human behaviour as unique
c) the multiple perspectives on learning, the stages involved, and its role in the mental process of building meaning.

Such comparisons led to the second research question:

What is the relationship between worldviews and the behavioural process?

The first two research questions created transdisciplinary common ground from which to further explore what influences the way people are and the way they behave. These questions allow a detailed investigation of how people sense and process information, how people interpret such information to build subjective meanings, and how such meanings are then integrated and expressed through the wide range of behaviours a person can display.

Hedlund-de Witt's (2014) work on worldviews represented a theoretical guideline for transdisciplinary integration of the various premises of human behaviour identified in the fragmented literature, which could help find some answers for the first and second research questions but, simultaneously, it shaped further questions. If a worldview is such a fundamental piece of people's identity, including how they know, think, feel and act concerning what is both in the world and in her/himself (Hand 2012, pp. 528-30; Johnson 2011), then it could be argued that unsustainable behaviours could originate in the depths of that individual's worldview. As Hedlund-de Witt argues

(2016a), for most people, just recognising the deeper assumptions they operate (behave) out of, in full awareness that these assumptions do not serve their deepest desires, is enough for them to make a powerful shift. In this research the attention was placed on exploring the extent to which people know about their own worldview, and whether it is aligned with their deepest motivations (potentially expressed through their behaviours), as a possible learning opportunity for transformation. This link will be discussed further in the next chapter as well as Chapter 5 due to the exploration of the third research question:

> **What happens when people are asked to self-recognise their personal worldview?**

The final research question established in this project was:

> **What are the most significant life experiences forming and transforming a personal worldview?**

The question emerged from early empirical work which revealed that experience plays a significant role in the formation, evolution, change and transformation of a worldview. As the findings presented in this thesis show, these experiences can have a greater influence on a worldview than all of our formal education.

It is often observed that transdisciplinary researchers integrate methods from diverse disciplines and fields of knowledge, and that they show certain inventiveness in designing their own methodology (Brandt 2013, pp. 4-5; Mitchell 2009, p. 14). In the case of this research, the integration of the literature on human behaviour gave rise to the Transdisciplinary Framework on Worldviews and Behaviours (TFWB), discussed in Chapter 3. This TFWB answered the first and second research questions from a theoretical perspective. It also influenced the empirical exploration of the remaining two research questions.

The methodology selected to guide this qualitative research process is based on the Constructivist Grounded Theory (CGT) approach suggested by Charmaz (Charmaz 2009), because it recognises the ever-changing nature of individual and collective realities, and addresses how people's experiences permanently affect their views on the local and larger world (Bryant 2007, p. 5; Vander Linden 2006). Details of the methodological strategy are presented in *Chapter 4: A qualitative design to explore worldviews and behaviours.*

The following section of this chapter will describe in more detail the general structure of this dissertation. It guides the reader through the exploration of the research questions, theoretically and empirically, and the elaboration of the corresponding answers, as well as the relevance of this doctoral contribution.

1.3 Organisation of the topics and chapters in this thesis

This first chapter presented the general context of study and the particular nature of the enquiry space in which this thesis is placed. The new challenges and opportunities in the field of ESD prompted the need to explore worldviews and behaviours – a need to which this research project responds. The chapter introduced the motivations, aim and research questions, as well as the methodological design. This section provides the general content of the following nine chapters.

Chapter 2 critically analyses the breadth and depth of the literature on dominant educational paradigms and their interconnection with the diversity of learning theories. It also identifies overlapping disciplinary premises about cognition and intelligence. Chapter 2 reflects on the scarce exploration of worldviews and explains how and why this term became a foundational pillar in the research project. The focus of this thesis is on the gaps identified throughout the literature review, and how they shaped the need for this research and the research questions presented above.

Chapter 3 presents the TFWB which is a theoretical explanation of what worldviews are and how they are mentally formed and physically expressed through the wide range of human conduct the body can display. The TFWB provided an answer for the first and second research questions, from a theoretical perspective, and also influenced the empirical design of this study.

In Chapter 4, the qualitative research approach and the chosen methods for data collection and analysis are discussed from a philosophical perspective, acknowledging the ontological and epistemological assumptions shaping the methodological considerations. The specific methods used are also described.

The findings of the empirical study are presented in chapters 5 and 6. Chapter 5 focuses on research question 3 and the struggle expressed by the participants regarding the self-recognition of their personal worldview. Research question 4 is answered in Chapter 6, which discusses the most significant life experiences forming and transforming the participants' personal worldview. These two chapters examine the reported experiences of 25 adults after self-reflection of their worldview. Results from the self-reflection suggest that, for this group at least, traditional education experiences have not played a significant role in the recognition of their worldview.

The outcomes from chapters 3, 5 and 6 are interwoven in Chapter 7, which proposes a new worldviews based learning framework. The relevance of this framework is explained in terms of its potential to explore how people apprehend and make sense of their own reality; form their unique structures of meaning; and choose their own ways of being, becoming and behaving. The ways in which this learning framework could contribute to the ESD transformative agenda are also outlined.

Chapter 8 summarises the main claims contained in this dissertation and provides a succinct answer to each of the four research questions. The significance of the

outcomes of this doctoral research, in the context of ESD, are described. Finally, recommended areas for further research are proposed.

The ninth and final chapter in this thesis provides the bibliographic references cited throughout the document. This final chapter is followed by four appendices, which provide the completed online questionnaires, interview questions guide, and samples of the coding process.

1.4 The contributions of this research project

The three main contributions of this doctoral study are the theoretical TFWB, insights from an empirical exploration of worldviews and behaviours, and the integration of the theoretical and empirical findings into a new learning framework based on a worldviews approach.

The theoretical findings and the empirical evidence presented in this dissertation represent the philosophical foundations for a set of learning principles aimed at informing new ways of designing learning experiences in the context of the transformative goals of ESD. These principles form a foundation for a distinct framework based on exploring worldviews, and intending to boost introspection and forming new conceptualisations about how worldviews shape what it means to be human. It is considered that insights arising from this process of introspection and re-conceptualisation have the potential to contribute to individual and collective transformation towards more sustainable ways of behaving, becoming and being.

1.5 Summary of chapter

This chapter introduced the central motivation for this research project, the general purpose and specific aim. It also reflected on the landscape in which the study sits, the complex nature of the enquiry space and how this research is focused on advancing

the contemporary shift towards the transformative agenda of ESD. Four research questions, focused on the contribution, theoretical conceptualisation and practical application of the concept of worldviews within ESD, were introduced, as well as the corresponding broad findings. This chapter also set out the structure of the thesis and a brief articulation of the main contributions of this work.

CHAPTER TWO: Exploring the broader and deeper context of Education for Sustainable Development (ESD)

'The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom'

Isaac Asimov

This chapter presents a critical analysis of the reviewed literature that explores the broader and deeper context of Education for Sustainable Development (ESD). The latest reports on ESD on a global scale revealed an emergent field of research and almost non-existent field of practice based on a more profound exploration of what shapes human behaviour, beyond the limited impact of pure knowledge or willingness and motivations to act in certain ways. The scrutiny of a diverse range of literature suggested that a personal worldview – a mental construct encompassing the meanings someone gives to the self, the other and the world – is what regulates the wide range of conduct a person can express. Thus, the term *worldview* emerged as a worthwhile concept for further exploration, leading to this investigative process.

This literature review spans ESD and related fields like learning, and what sits behind human behaviour. Due to the lack of a coherent conceptual framework, but an abundant and disjointed multiplicity of theories, approaches and models, worldview emerged as a powerful integrating concept. This term alone has the capacity to encompass the complexity and wholeness of the mind; it also describes the transdisciplinary intent of this thesis. This chapter argues that there is need for a fuller comprehension of what worldviews are; how and when they are formed, transformed and expressed; and the convenience of considering the nature of worldviews as a potential new learning approach.

Navigating from the general to the particular, from the broader to the deeper context of ESD, this chapter first introduces a brief reflection on the two dominant and

disjointed educational paradigms identified through the literature review, and the need to reconcile them in the context of the transformative goals of ESD. Then, the body of the chapter analyses those learning premises where *educare* and *educere* can be reconciled. This section, mostly informed by the vast and disconnected field of multidisciplinary research on embodied cognition, reviews the processes of the mind, and the contents of the mind. Afterwards, the chapter discusses the potential role of worldviews in the integration of a more holistic view on learning, meaning-making and behaviour, where both educational approaches can be merged. The chapter concludes with a compilation of the gaps identified throughout the literature review and the consolidation of the research questions guiding this investigation.

2.1 Two disjointed educational paradigms: e*ducare* and *educere*

This section presents two distinct conceptualisations of education and identifies the need for their reconciliation, in order to ensure a holistic approach aligned with the transformative goals of ESD.

The English word *education* has two possible Latin etymological roots: *educare* and *educere*. There is a clear distinction in their significance: *educare* (or *educavi*) means to direct someone, to mould or to train; *educere* (or *eduxi*) means to lead out or to bring forth what is within, to educe or evoke that which is latent in an individual (Bass 2004). This subtle distinction indicates the complex, detrimental and ancient disputation in the philosophy of education.

Those who have stressed the preservation of culture through a curriculum that emphasises instruction, obedience and the acquisition of certain types of knowledge have been opposed by those who prefer self-expression, individual curiosity, creativity and a flexible curriculum embodying choice (Craft 1984, p. 9). The detrimental impact of such dichotomy, with a clear dominance from the former paradigm named here as *educare* over the latter, *educere*, relies on the deeply ingrained view of education as a

linear process largely devoted to ensuring social continuity, to the point of endangering social change (Bass 2004; Craft 1984). The implications of this fundamental premise for the transformative aspect of education are discussed further in the following paragraphs.

The industrialised modern era has framed the development of a society dominated by the Cartesian-Newtonian, or Mechanistic Paradigm, which assumed that any entity or process in the physical world can be broken up into a fixed number of fundamental parts, or qualities, and laws (Dogan 2001, pp. 11023-4; Kilbourne 2000, 2005). It explains the physical world in the Newtonian terms of a machine, with particular laws governing its functions and patterns, and with a fundamental division between that physical world and the human mind, separated on a Cartesian grid of time and space (Chatterjee 2013, p. 77). Although this paradigm has permeated every aspect of society during the last three centuries, one of the best examples of its impact is the educational context, as set out below.

Education as *educare* is widely expressed in the modern educational systems, which began to take shape in the 18th century and became a globalised institution in the 20th century. This system is oriented around the '*construction of the child as a future citizen',* where children were conceived as mouldable souls in the social, political and economic growth contexts, who would learn to act from reason and logic in the name of the public and common good (Trohler 2011, p. 12). The dominant psychology of the modern age has been fundamentally materialistic, mechanistic, objectivistic, atomistic and, in a word, reductionist; human beings have been conceived as isolated individuals engaged in competition for physical, social and emotional sustenance (Jörg 2008).

Motivated by biological drivers of self-preservation and reproduction, physical states such as pleasure and fear, and social forces such as cultural morals or power relations involving the means of progress, humans have been assumed to operate according to invariant natural laws, and hence can be trained and managed by the proper use of

behavioural techniques (through education). These foundational assumptions reflect the conception of human psychology as a logical science, a vision of human nature embodying the Cartesian-Newtonian age (Jörg 2008, pp. 96-7; Miller 1990, pp. 314-5).

Education as *educare* invokes an indoctrination process aimed at the preservation and passing down of information and knowledge (not meaning) and the shaping of new generations according to the image of the previous. The curriculum represents a fragmentation and objectification of the human experience, an abbreviation of life where the world is compartmentalised into subjects and departments for its mechanised consumption (Miller 1990; Orr 1991). Pedagogical methods commence with the arrangement of the classroom in separation from the community and continue with the imposition of materials and tasks selected for specific instruction. These methods also involve the use of rigid tests, grades and tracking, where learning is seen as a final product rather than a complex process; learning is seen as an outcome which can be accurately measured, rather than an evolving engagement with experience (Miller 1990; Teeroovengadum 2012).

Supported by prevailing Enlightenment and Industrial notions of reason and progress, one country after another created their own modern education system, or adopted one, as the new model of socialisation and development (Miller 1990; Orr 1991; Trohler 2011). The hierarchical administration of schools has long reflected the ideology of efficiency and scientific management, which educators learned from business and industry (Miller 1990). Under this system, students are assumed to be moved by competitive impulses largely based on fear of failure and punishment, or on reward and recognition (Miller 1990; Teeroovengadum 2012).

Based on the Cartesian-Newtonian Paradigm, which established the roots of the radical separation of the object and the subject, modern education has been based on the dominance of the analytical mind over creativity, humour, emotions, affection, spirituality and wholeness (Gardner 1989; Orr 1991). All kinds of facts, techniques,

methods, and information have been transferred into the minds of new generations, regardless of how such an inheritance will be interpreted and acted out according to the unique meanings each individual builds (Kolb 1984; Kolb 2011). Education as *educare* is influenced by the interactions between economic and political forces (Bertocchi 2004; Ramirez 1980) and represented by those systems producing '*useful human capital for unlimited progress*' (Schofer 2005, p. 898) where education is an efficient mechanism '*to prepare well-behaved citizens and good workers*' (Bass 2004, p. 164). This approach is evident in the national Australian education system, where the three main educational goals align with *educare*. They state that educational services have to be '*delivered in a way that actively engages parents and meets the workforce participation needs of parents',* and that all students need to '*acquire the knowledge and skills to participate effectively in society and employment in a globalised economy*' in order '*to enable them to be effective participants in and contributors to the modern labour market*' (Australian Government 2017, p. B8).

The benefits of modern education are well documented through large volumes of research using quantitative and qualitative data. The literature provides robust historical evidence of a substantial pay-off from expanding on and investing in education, at individual and national levels (Krueger 2001; Meyer 2000). The modern state has been an agent for an expanding array of the domains of human development, from individual health to scientific and economic growth. Education, in particular, has been a leading contributor to the high structuration, organisation and professionalization of societies (Meyer 2000). The enormous transmission of knowledge and skills inherent in modern education has prepared several generations for an increasing range of roles, facilitating, for example, the local and global adaptation of humanity to rapid technological change (Martin 2005). There is strong evidence that encouraging the cognitive skills of the population is directly related to an increase in individual earnings, to the distribution of income, and to the economic growth of society. This, in turn, contributes to the consolidation of a developed

economy, and higher quality of life for individuals conforming in such a society (Hanushek 2007; Schofer 2005).

Though education as *educare* has contributed to human progress at all possible levels since the 18th century, this modern approach has resulted in a high toll on mental, social and environmental stability on a global scale (Kahn 2007; Nieto 2005). A large number of studies criticise the '*factory model'*, often used to describe attributes such as '*standardisation, hierarchical management, competition, and treating people as a resource and their learning as a product, both with economic value'* (Teeroovengadum 2012, p. 2). In recent times, among the first globally renowned authors strongly arguing that such a model has a detrimental impact was Paulo Freire in *Pedagogy of the Oppressed* (Freire 1970) and 'The Banking Concept of Education' (Freire 1998, 1999); these two contributions emphasise the downside of modern education. Freire, among other authors that will be mentioned later in this section (Cox 2000; Palmer 2001b; Vardin 2003), advocated for an approach that aligns with *educere* rather than *educare*.

The crucial point in this discussion is that, even when it has been an integral part of the human experience to take for granted that '*the work of our hands, heads and hearts*' will live on through those who come after us (Macy 2007, p. 18), where every generation prior to ours lived with the assumption that the following generations would follow the same paths, it seems that it is now time to acknowledge and adjust such an assumption, and to reflect on possible alternatives. If education today is to contribute to addressing one of the biggest global challenges facing humanity (unsustainable tendencies of being), then it could be argued that, while it is necessary to ensure the reasoned legacy of humanity, it is also necessary to allow the creative exploration of possible new meanings to such a legacy. The intent would be to enable the creation of a new narrative, distinct from the one rooted in the unsustainable paradigms of the modern era. Allowing a deep exploration of what individuals,

communities and the environment actually are can open the opportunity to explore what they could be.

Education as *educere* represents and emphasises self-expression, affective expression (artistic expression), curiosity, creativity and choice (Craft 1984). By questioning, critically thinking, creating different interpretations and playing with significance, *educere* implies the gradual process of self-exploration of the inner capacities and the self-recognition of one's own potential, embracing the idea of freedom of choice and expression of built meanings (Adeyemi 2002). An *educere* approach to education represents the contradistinction of indoctrination represented by *educare* (Adeyemi 2002; Craft 1984).

Rousseau, Pestalozzi, Montessori, Freinet, Steiner and Dewey (Palmer 2001a; Vardin 2003) are among the most renowned authors of the last two centuries who have identified and discussed the relevance of the natural and social environment in educational contexts. Both inside and outside the classroom and the school itself, human interactions, and interactions with other beings, are central to learning. Among the most relevant aspects recognised by these authors are the influences from family and community on children's development; curiosity, confusion and doubt; and reality as a whole phenomenon not to be fragmented (Velasquez 2005). In modern history, thinkers like those mentioned above, and more recently Gardner (Gardner 1989, 2014a; Vardin 2003), who have suggested alternative approaches and models to the traditional educational system, have not been formally supported. On the contrary, sometimes they have been dealt with harshly, and eventually faded from the dominant educational scene (Bass 2004).

During the late 20th century, along with Gardner's work, three learning theories could also be directly related to the *educere* approach to education. These three theories gained attention in the 1970s and continue to evolve, with more or less recognition from the educational global sphere. Kolb's Experiential Learning Theory (Kolb 1984),

Bandura's Social Learning Theory (Bandura 1971) and Mezirow's Transformative Learning Theory (Mezirow 1975a, 1975b) have a learner-centred approach. The common goal is to guide individuals into self-actualisation and self-direction, encouraging self-knowledge, self-awareness and internal motivations (Brown 2002a).

These three theories consider that learning is complex and multidimensional, and that it appears to be inextricably connected to the learner's experiences (Brown 2002a). Kolb is among the theorists emphasising the process of learning from experience, he explained how the learner's formulation of generalisations and theories about the experience could culminate in their active experimentation and application of derived concepts in new situations (Fenwick 2001; Kolb 1984). Dewey, Vygotsky, Bandura and the social theorists listed above highlighted that learning takes place not in isolation but through observation and modelling in social settings, such as the family, the workplace and schools (Bandura 1971; Tudge 1993; Vygotsky 1966). Mezirow defined transformative learning as the process of learning through critical self-reflection, where the interpretive frames of reference about reality are changed due to challenging experiences (Mezirow 1975a, 1975b). He identified 10 phases clearly recognisable in a transformative leaning experience (Kitchenham 2008; Mezirow 1990):

1) a disorienting dilemma
2) a moment of self-examination with feelings of guilt or shame
3) a critical assessment of epistemic, sociocultural or psychic assumptions
4) recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change
5) exploration of options for new roles, relationships and actions
6) planning a course of action
7) acquisition of knowledge and skills for implementing one's plan
8) provision for trying new roles
9) building of competence and self-confidence in new roles and relationships

10) reintegration into one's life on the basis of conditions dictated by one's perspective.

These theories claim that learning is not a linear process but a continuous spiral where emotions and thoughts are the basic elements of understanding, constantly formed and transformed through life experiences (Bandura 1971; Kolb 2011; Merriam 2013; Merriam 1993; Mezirow 1997; Squire 2015). Learning is a continuous spiral process because through their lifespan an individual constantly recycles meanings, creates new ones and transforms old ones, in a cyclical process of experience which can take him/her to a higher level of understanding about his/her inner and outer environments (Squire 2015).

In general terms, research on education, as *educere,* has not been an investigative priority in the literature. Although it is beyond the scope of this study to provide a diagnosis of the matter, a brief compilation of the main features of *educere* identified in the related literature includes the following six characteristics (Cox 2000; Gardner 1989; Helding 2009; Lange 2002; Lange de Souza 2012; Lange 2004, 2012; Ray 2015; Vardin 2003):

1) While academic achievement is important, it is generally seen as secondary to individual wellbeing and happiness; it is only valuable if it helps someone to identify and achieve the ultimate goal of self-fulfilment.
2) The main moral value taught is equity: respect of human uniqueness and diversity, where everyone has an equal right to wellbeing and self-determined fulfilment.
3) There is autonomy in the learning pace and motivation, allowing flexibility in structure and content, emphasising student decision-making and expression of meanings, with non-competitive evaluations.
4) Evaluation does not consist of a linear assessment of progress towards specific curricular goals but the analysis of the ability of the whole educational

environment to facilitate the investigations that students choose and find rewarding.

5) Carers, students, teachers and community are interconnected.
6) Small group sizes are favoured, emphasising one-on-one and more intimate interactions among people, creating a supportive environment to self-explore and self-express individual uniqueness and collective diversity.

At the core, these thinkers and their models challenged the status quo regarding the human mind, learning and the human potential in its broad sense. They demonstrated the complexity and uniqueness of each individual when learning and forming subjective meanings (Cox 2000; Lange 2002; Lange de Souza 2012; Lange 2012; Vardin 2003). These renowned authors challenged rigid and narrow views about human learning by studying people from different backgrounds, in different contexts and with different mental abilities (including children and adults with brain damage) and appreciating and reporting on the wide range of learning capacities found in human nature (Lange 2002; Vardin 2003). They noted, for example, that the strengths children may demonstrate in one area of development (sensorimotor), do not necessarily ensure or predict strengths in other areas (abstraction); children soon reveal profound individual differences which call for very different kinds of help from their teachers and surrounding environment (Ray 2015; Vardin 2003). Then, as time passes and children mature, experiences are accumulated, complex meanings formed and critical reflection developed; learning is lifelong, and people are constantly experiencing changes and, occasionally, transformations of meanings (Brown 2002a; Fenwick 2001).

These scholars argued that the interaction of nature (genetics) and nurture (environment) plays a significant role in the differentiation of the learning capacities each person develops (Ray 2015; Vardin 2003). Children seem to possess natural tendencies, but the characteristics of the environment where they grow up can greatly enhance their learning capacities, or seriously diminish them (Ray 2015; Vardin 2003). In general, identifying, understanding, respecting and enhancing these differences is of

utmost importance for individual and collective wellbeing and healthy development (Cox 2000; Kolb 2005).

Education as *educere* embraces the complexity and uniqueness of the human mind, and the diversity of humankind. It emphasises the role of self-recognition, one's own construction of unique (subjective) meanings, and creative expression. Education as *educere* is based on the freedom to self-explore and critically choose how to be, become and behave.

According to Bass (2004), *educare* and *educere* are of equal importance and need to be reconciled. An educational approach that ignores *educare* dooms its participants to the need for each generation to start over in exploring and discovering; omitting *educere* produces good workers incapable of questioning and changing their own reality (Bass 2004).

Education today, while ensuring the preservation and transmission of the accumulated reasoned legacy of humanity, could also ensure the uniquely subjective exploration of possible new meanings to such a legacy. Particularly in the context of ESD and its transformative goals, which recognise the complexity of human behavioural changes and focus on deeper explorations of possible new meanings to human existence, *educare* and *educere* seem to be in need of reconciliation. As explained above in section *1.1 The enquiry space: new challenges and opportunities in the field of the Education for Sustainable Development (ESD)*, ESD now centres attention on the inherent human feature to build, change and transform the meaning of any experience at any time and to, consequently, modify patterns of emotion, thought and action derived from such meaning. This task demands *educare* and *educere* working in unison, honouring the complexity of human nature.

As briefly mentioned in the previous chapter, one of the greatest challenges humanity faces today is to operate within the capacity and boundaries of all Earth's natural

systems, which requires a profound reassessment of the modern meanings given to human existence. In order for education to contribute to more sustainable realities, the priority needs to broaden the scope from producing human capital, well-behaved citizens and good workers, to also facilitating the exploration and experience of new ways of being, becoming and behaving (Drengson 2011; Kamhi 1994).

In this research, identifying the theoretical need to reconcile *educare* and *educere* to achieve the ESD transformational goals led to a deeper exploration of the foundational premises of the educational research and practice fields. While searching for overlapping premises from which conceptual bridges could be built, an enormous number of learning theories and models developed throughout the 20th century (clearly influenced by both paradigms) emerged for investigation. The critical synthesis of this search is presented in the next section.

2.2 Learning premises where *educare* and *educere* can be reconciled

Learning is a complex matter, and there is no generally accepted definition; indeed, '*the science of learning remains in a constant flux*' because of the great number of theories that have been developed, particularly during the last century (Cassidy 2004, p. 425). From Behaviourism, Cognitivism and Constructivism to the more holistic Humanism, each of these four views of human learning have produced dozens of theories (Ackerman 2001; Jackson 2015; Raina 2011; Terwel 1999). With varying prevalence, hundreds of authors have explained human learning from multiple perspectives (Cassidy 2004). Some of these premises refer exclusively to the biochemical connection between environmental stimuli and behaviour, or the influence of genetic expression and neurological processes. In addition to these organic views, psychological and philosophical explanations about meaning-making are also found in the literature (Cassidy 2004; Illeris 2009). Nowadays, research on learning also includes the emotional and spiritual dimensions of the mind (Illeris 2009; Kraiger 1993; Morris 1988; Neuman 2010).

This section aims to distinguish overlapping learning premises where *educare* and *educere* can be joined. This literature selection encompasses those premises where learning is directly and clearly linked to behaviour, and where historically prevalent dichotomies like: mind/body, objective/subjective, cognition/affection and unconsciousness/consciousness are blurred, facilitating the identification of overlapping postulates.

This process was informed first by reviewing Piaget's Theory of Schemas (Piaget 1952), Gardner's Theory of Multiple Intelligences (Gardner 1989), theories on embodied cognition (Anderson 2003; Mahon 2008; Wilson 2002a), studies on intelligence (Almeida 2010; Anastasi 1998; Calvin 1994; Carello 2012; Conway 2015), research on affective learning or emotional intelligence (Davidson 2009; Goleman 2011; Kraiger 1993; Lerner 2015; Neuman 2010) and Siegel's Theory of the Interpersonal Biology of the Developing Mind, or IBMD (Siegel 2001). This section is divided into two subsections: the organic bases of learning or mental processes in 2.2.1, and the learning products or mental contents in 2.2.2.

2.2.1 The processes of the mind: intelligence, learning and memory

Theories of cognitive development can be divided into two categories – before and after Piaget (Piaget 1952) – because of the ground-breaking impact of his work (Barrouillet 2015). This introduction briefly reviews how Piaget's work, and the critique made by Gardner's work, led to the development of theories on embodied cognition, which constitute one of the pillars in this literature review.

a) Introduction

Among all theories on cognitive development, referring to stages of psychological or mental maturation over time, Piaget's work became the main reference due to the complexity of his work covering different aspects of learning simultaneously (Barrouillet 2015). For example, Piaget (1952) argued that there is a biological basis of

such processes in children, while exploring the sensorimotor responses of a baby's body to repeated environmental stimuli. He also referred to *schemas* as the mental units where environmental stimuli are mirrored into concepts; and he explained how basic schemas are constantly integrated into more complex meaning structures as the infant grows and accumulates life experiences (Malerstain 1979; Piaget 1952). Schemas will be explored further throughout this chapter; in this section, it is important to note that Piaget's work refers to intelligence rather than learning and to knowledge instead of meaning, because these interpretations prompted Gardner's critique. He argued that there are multiple types of stimuli, multiple kinds of knowledge and multiple forms of intelligence (Gardner 1979; Gardner 2014b).

In Piaget's work, each stage of development or psychological maturation included psychometric tests measuring aspects of intelligence through knowledge and choices of behaviour (Carrol 1984; Keng 1988). His correlational studies generally found positive relationships between mental age, knowledge and behavioural performance based on concrete operational tasks (Carrol 1984; Keng 1988). This achievement accentuated the proliferation of measurement tests of a *general intelligence* (*g* or Intelligent Quotient, IQ), which were slowly developing during the first half of the 20th century (Carello 1984, 2012; Sternberg 2005).

Gardner's position refused a general factor of intelligence (Almeida 2010). He identified and built upon certain limitations in Piaget's approach, purely based on linguistic/verbal and spatial/mathematical types of knowledge. Gardner's work considered the specific characteristics of diverse environmental stimuli, and argued that they could generate the formation of different types of schemas, creating distinct symbolic systems in the mind (Gardner 1979). Gardner argued that the human mind is modular in design, with separate psychological processes appearing to be involved in different kinds of schemas and symbolic systems (Gardner 1989). Gardner agreed with Piaget's explanation that intelligence is the biological or organic capacity of the human body, as a whole, to process information received from diverse environmental stimuli.

Gardner then expanded on the types of information and the subsequent creation of seven initial categories of knowledge, achieved through seven forms of intelligence: linguistic, logical-mathematical, spatial, bodily-kinaesthetic, interpersonal, intrapersonal and musical intelligence (Gardner 1979). Due to critiques received – for example, on the controversial use of the word *intelligence* the lack of tests to measure each type of intelligence, or the arbitrary aspect of his classification (Klein 1997) – Gardner later made some amendments (Gardner 2011; Gardner 2014c; Gardner 2014a; Gardner 2014b). Through this process, he also opened up the discussion about two more forms of intelligence: naturalistic and existential (spiritual). These emphasise the role of emotions considered previously in his inter- and intrapersonal intelligences, and the sensation of interconnectedness. This discussion will be addressed further in this section.

This review of the work of Piaget and Gardner showed that the body perceives different forms of environmental stimuli throughout the wholeness of the body, and the mind creates different types of schemas and systems of knowledge. Learning does not involve only the rational and logical level of the mind; social relationships, emotions, art and creativity, connection with the environment and the divine were elements that were also brought into the discussion. These elements align with the *educere* approach to education, which embraces the need to explore further how the body and the mind interconnect, and together apprehend, signify and interact with the environment. In the neo-Piagetian literature, along with Gardner, theories on embodied cognition emerged as a more integrated approach to learning, where insights were provided by not only developmental psychology and cognitive sciences but also anatomy, neurology, anthropology, evolution, affective sciences and quantum physics (consciousness).

b) Theories on embodied cognition

In this research, theories of embodied cognition are considered not only because of their inherently integrative nature but also because they allow a closer analysis into

the three main mental processes distinguished in the literature: intelligence, learning and memory. Intelligence and learning are commonly used as synonyms. However, in this research they represent two clearly distinct mechanisms: information-processing and meaning-making, respectively. This section considers embodied cognition as the master process of the human mind encompassing intelligence, learning and memory.

The need to explore embodied cognition in detail corresponds to the interest in finding the core aspects of learning, where *educare* and *educere* could complement each other. For example, what is the neurological basis of Gardner's multiple intelligences theory? What is the role of the body in learning? And where do logical and critical thinking meet emotions and creativity? These were some of the interrogatives guiding this closer look into the embodied cognition approach, which apropos circumscribes about two decades of research, with multiple theories and models. The following paragraphs display the five key premises identified in the vast range of literature.

Theories on embodied cognition challenge the fundamental divisions between the subject and the object, thoughts and emotions, the physical world and the mind, which are inherent in the mechanistic premises of the Newtonian-Cartesian dualistic grid of time and space (Chatterjee 2013, p. 77). These theories emerged about three decades ago and have been evolving since. They belong to the wholeness of the Humanism approach to learning and being, due to the emphasis they place on the inseparable interconnectedness among the body, the mind and the environment (Maturana 1998; Varela 1993a, 1993b).

The first out of four closely interconnected premises of embodied cognition explains that the mind is embodied. Descartes argued for what he thought were two distinctive entities: the mind (used as a synonym of soul) and the body, '*inasmuch as body is by nature always divisible, and the mind is entirely indivisible*' (McNerney 2011, p. 1; Vroom 2006). In contrast, theories on embodied cognition consider both entities as inseparable and divisible. As part of the discussion on the embodiment of the mind,

quantum and cosmic physics consider the mind as a quantum energetic field spread across the body, where all neural connections converge; they consider the whole human body as an open system in direct exchange of energy with the environment and the universe through quantum flows (Meijer 2014). These views from quantum physics align with studies on the extended mind, arguing that the mind is not contained only within the boundaries of the skull (Clark 2010; Wilson 2015) nor the body, as established by the Theory of IBDM (Siegel 2001, 2012).

The second main premise of embodied cognition explains that the very nature of cognition comes from the details of embodiment. It is in the embodied mind where cognition occurs; thus, to understand cognition it is necessary to further explore some aspects of the body, such as details of the senses, the motor system and the general mechanism of neural binding (McNerney 2011).

Cognition is activated by internal or external stimuli. They create a physicochemical stimulation of the receptor organs spread across the body, which is translated into a physiological electric impulse, a process named sensory transduction. This electric impulse travels through the nerves in the body (the peripheral nervous system) towards the spinal cord to and into the brain (the central nervous system), where a behavioural response to the corresponding stimuli is chosen, and then acted out by the body. This research acknowledges that there is an open debate about the number, limits and classification of the human senses (Prieto-Gonzalez 2014). For example, Friedman (2005) identifies five additional senses to those that are commonly recognised (taste, sight, touch, smell and hearing). These additional senses are thermoception (for temperature), proprioception (or kinaesthetic sense for movement), equilibrioception (for balance), mechanoreception (for vibrations) and chronoception (how the passage of time is perceived and experienced).

Studies of how stimuli activate the cerebral machinery provide a range of hypotheses of how stimuli and neurons interact (Salzman 2010). According to Koch (2007), a

coalition of pyramidal neurons linking the back and front of the brain cortex fires in a unique way, where different coalitions activate to represent different stimuli from the senses. For Greenfield (2002), neurons across the brain fire in synchrony and prevail until a new stimulus prompts a different assembly to emerge, and various assemblies interact and dissociate in endless continuums. Another example comes from the Quantum Theory of Consciousness, which considers the nervous system as a mixture of the macroscopic neuron systems (pathways of conduction for neural electric impulses) and an additional microscopic system, assumed to be a quantum system (the smallest possible unit of energy or matter) interacting with the macroscopic in chaotic and unpredictable ways (Beck 1998; Gardiner 2010; Gennaro 2007; Georgiev 2015; Meijer 2014; Sanchez-Canizares 2014; Tarlaci 2010).

Regardless of the hypotheses above, each individual's genotype expresses in a unique way (Abeyta 2004); consequently, each nervous system is slightly different even between genetic clones (identical twins), which means that each person computes stimuli differently, experiencing life in a unique way (Koch 2007). Electricity running across the neuronal cells fires personalised patterns of cellular connections with particular strength and extension in its brain cells (Matzel 2011; Taylor 2015; Varki 2008).

In this context, it could be argued that the second main premise of embodied cognition (the very nature of cognition comes from the details of embodiment) implies that, although this is a common neural process shared among humans, it is differentiated in each and every individual. Each person has a slightly different nervous system with particular strength and extension in its brain cells, experiencing life differently from others, resulting in a unique mind. Because the mind mirrors the information gathered from stimuli in any given experience, the mind becomes unique too, a premise clearly stated in the *educere* paradigm.

The third main premise of embodied cognition explains that cognition begins and ends in the body (not in the brain), where emotions are the central energy activating the process. The human body has evolved from creatures whose neural resources were devoted primarily to perceptual and motoric processing, and whose mental activity or cognition consisted largely of immediate interaction with the environment (Wilson 2002a). From this it could be inferred that human cognition, rather than being centralised (cerebral), abstract and sharply distinct from the body, may instead have deep roots in the embodied sensorimotor processing (Wilson 2002a). In other words, '*Knowledge structures*' emerge from and are used in '*body-based experiences*' (Amin 2015, p. 746).

The word *emotion* originates from *émouvoir* in French, which means movement (Cabanac 2002). The term refers to a set of bodily sensations, where a sensation requires the physicality of the body (Anderson 2003); it is the bodily awareness that evolved from the ancestral neural devotion to sensorial and motoric processing. Emotions are considered as brief episodes of neural coordination, facilitating a bodily response (sensation) to stimuli or experiences of significance for the organism (Davidson 2009). Embodied cognition recognises the basic role of emotions as stimuli responses from the peripheral nervous system, in the creation of the mind (Anderson 2003; Mahon 2008; McClelland 2015; Wilson 2002a). Sensations constitute bodily awareness or emotions, subjectively valuated as feelings (Cabanac 2002). According to IBDM, emotions activate the embodied mind and its cognitive process to move the body; thus, emotions are considered the central energy of mental life (Siegel 2012).

The third premise of embodied cognition means that learning, intelligence and memory are largely dependent on bodily awareness or emotions, constituted by multiple sensations (Amin 2015; Anderson 2003; Lerner 2015; Mahon 2008; Squire 2015). Embodied cognition argues that the senses and their receptor organs spread across the body generate physiological reactions to stimuli that activate sensations and a particular emotion. This, in turn, can produce a simple specific action or a more

complex cognitive predisposition, or thought, to assess further the stimuli or experience at hand. A thought is a specific and ephemeral mental configuration produced when reasoning or thinking (Matzel 2011); it is a cognitive predisposition that includes the content of thought, the depth of thought and goal activation. Emotions may directly evoke an action, or a thought with particular content, depth and motivation (Lerner 2015), and then the resulting action. This is depicted in Figure 2.

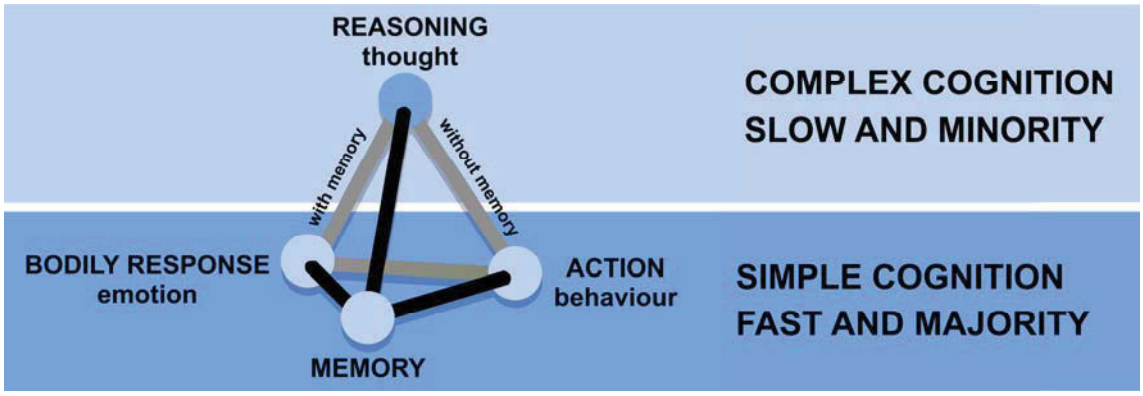

Figure 2. Diagram purposefully elaborated to show how embodied cognition occurs and evolved.

More specifically, as illustrated in Figure 2, embodied cognition holds that emotions can lead to thoughts. Thoughts can be expressed through a specific action, with or without the intervention of the memory systems, and vice versa (Anderson 2003; Squire 2015). An action influences thoughts, and these can modify emotions, with or without the intervention of the memory systems (Anderson 2003; Squire 2015). However, the involvement of the thinking facet is the long and slow route, the one that has evolved over time (the implications of which will be discussed further in Chapter 7), named 'complex cognition' in Figure 2. The theory of embodied cognition establishes that the shortcut or fast process dominates. Consequently, most actions rapidly occur in response to emotions, without the thinking facet engaged (Anderson 2003; Mahon 2008; McClelland 2015; Nunez 2015; Smith 2015; Squire 2015; Wilson 2002a). The memory systems may or may not intervene in the fast process (Anderson 2003; Squire 2015). This type of cognition is named 'simple cognition' in Figure 2, and it is strongly grounded in the ancestral bodily experience (McNerney 2011).

Research on memory suggests that there are different kinds of memory, which are supported by different neural connections. One major distinction can be drawn between working memory (or short-term memory) and long-term memory; then, the latter can be separated into declarative (explicit or conscious) memory and a majority of non-declarative (implicit or unconscious) forms of memory that include habits, skills, priming and simple forms of conditioning (Smallwood 2008; Squire 2015). These memory systems:

> *…operate independently and in parallel to support behaviour, and how one system or another gains control is a topic of considerable interest. In some circumstances, memory systems are described as working cooperatively to optimize behaviour and in other circumstances are described as working competitively. (Squire 2015)*

Most parts of human learning (meaning-making) and intelligence (information-computing) do not involve thought (a more complex cognitive predisposition) but emotions and memory, because they are essentially ancestral mechanisms. This claim of embodied cognition can also be described by the affirmation that humans or '*thinking beings ought therefore be considered first and foremost as acting beings*' (Anderson 2003, p. 91), because the body and its emotions function as a primary constituent of cognition (intelligence and learning), rather than being just a passive subordinate simply serving an '*enskulled*' (Siegel 2012) mind (Leitan 2014, p. 5; Siegel 2001, 2012).

Traditional cognitive sciences sustaining the *educare* conception of education do not represent these embodied and emotional views on intelligence, learning and memory. As explained in Piaget's approach to a measurable intelligence, based on linguistic/verbal and spatial/mathematical types of knowledge, for centuries the argument has centred on the logical dimension of reasoning and abstract thought,

reflection and critical thinking; emotions were considered elements that fall outside the domain of cognitive explanation (Almada 2013).

Like the first two premises, this third premise of embodied cognition also represents a revolutionary view on human research. The role of emotions in human functioning has not been a research priority in behavioural or cognitive science. The taxonomy of Bloom (Bloom 1956) and his less renowned colleague Krathwohl (Krathwohl 1964; Krathwohl 2002), and then the multiple intelligences of Gardner (Gardner 1989), encapsulate the work of the first authors who recognised the role of emotions in learning. While Bloom (1956) and Krathwohl (1964) referred to the affective domain of learning not just as a simple catalyst but as a necessary condition for learning to occur (particularly focused on motivation), Gardner discussed the lack of emphasis in the affective/emotional aspect of learning in research on cognition.

Gardner's (1989) intrapersonal intelligence (understanding of one's own emotions) and interpersonal intelligence (ability to perceive and understand other people's emotions), along with Salovey, Mayer and Goleman's work on emotional intelligence (Goleman 1995; Helding 2009; Salovey 1990), noted the omission of emotions as subjects in cognitive studies. These authors made the sensible case for the relevance of emotions as research and teaching priorities, based upon their critical importance to human life (Goleman 1995, 2011). Gardner (1989) noted that the result of poor personal intelligences can have disastrous consequences, whereas the decision to employ (or not) one's mathematical intelligence is not always so problematic. Nowadays, the study of human affection and the influence of emotions in mental and behavioural functioning has led to the foundation of affective sciences, a rapidly growing transdisciplinary field (Davidson 2009), recognising that any mental process, like learning, is an evolved capacity largely dependent on the body and its responses (Almada 2013; Floresco 2015; Izard 2010; Scherer 2009; Wilson 2002b).

To sum up, the third premise establishing that cognition begins and ends in the body (not in the brain), where emotions are the central energy activating the process, shows that theories of embodied cognition have been exploring how people process and signify emotional information, arguing that there is a fundamental interrelationship among bodily expressions or emotions and the way in which emotional information is attended to, interpreted, and then acted out (Niedenthal 2007; Semin 2008).

The fourth premise of embodied cognition explains that most of it occurs unconsciously. Like the previous premise, this refers to the ancestral roots of human anatomy and physiology, contrasting with the hegemonic concept of conscious processing of information in modern (*educare*) views on cognition (Almada 2013). The third premise, presented above, is based on the evidence of affective processes being supported by brain structures that appeared earlier in the phylogenetic scale than conscious reasoning (thought), as shown in Figure 2 (Almada 2013, p. 253). This phylogenetic approach also explains the fourth premise, where the majority of the unconscious mind is highlighted. Emotions and unconsciousness guide the vast majority of mental functioning.

Although the literature usually notes only the conscious and unconscious dichotomy, more nuanced models add value to the exploration of embodied cognition. Authors like Schooler and colleagues are distinguished by their rather integrative view, as explained by Schooler's tripartite model that includes unconsciousness, consciousness and meta-consciousness (Schooler 2004a; Schooler 2015; Smallwood 2015). In this, unconscious, or nonconscious, content eludes conscious detection and self-recognition (Schooler 2015; Smallwood 2015). Experientially conscious content is subjectively detected but is not necessarily explicitly noted or reflected upon (Schooler 2015; Smallwood 2015). Meta-conscious content is not only experienced but also the target of explicit characterisation by critical self-reflection (Schooler 2015; Smallwood 2015). Meta-conscious content is explicitly represented as content of one's own

consciousness; it is owned by the person (Schooler 2004a; Schooler 2015; Smallwood 2015).

Schooler and colleagues' orientation informs the view in this thesis that consciousness is a stream of intermittent attention, from unconsciousness to meta-consciousness; it is a single undivided mental continuum where the experience in turn activates different levels of consciousness (McLaughlin 1990; Schooler 2015). The level of consciousness that someone can have about something varies depending on the experience in place, and varies even more when comparing different individuals facing the same experience (Schooler 2004a; Schooler 2004b; Smallwood 2015).

Conscious learning refers to the noticeable acquisition or construction of knowledge and meaning, even without intending to do so; it is generally associated with traditional educational settings (Capa 2011; Rebuschat 2015; Squire 2015). Meta-conscious learning only happens by the self-recognised intention of the individual (Schooler 2015). Based on a numeric metaphor, it has been suggested that 95% of the human mind resides at the unconscious level (Bargh 1999). To consciously and meta-consciously evaluate one's own thoughts and emotions requires a considerable energetic effort, and they are relatively slow processes; even more, they require a limited energetic and attentional resource that is quickly used up because it rarely remains on one topic for an extended period without deviation (Smallwood 2015). Consciousness and meta-consciousness can only occur barely and for a short time. However, the unconscious or automatic responses are unintended, effortless and very fast, and they operate at any given time; these ancestral and deeply rooted bodily responses are continually guiding the individual safely through the day (Bargh 1999, p. 476).

In the neo-Piagetian context – particularly after Gardner's work – intelligence and memory became increasingly recognised as the basic ancestral mechanisms underlying the more sophisticated capacity to learn (Conway 2015; Sternberg 2005), and this is

how they are acknowledged in this doctoral thesis. Based on the ancestral roots of the nervous system, intelligence is defined here as the capacity of any living organism to compute, process or analyse the data gathered by the senses about itself and the surrounding environment, mirroring such information into mental schemas, the units of mental contents. Learning, in turn, is considered as a multidimensional phenomenon of meaning-making, where initial schemas are combined to form increasingly complex meaning structures, as explained in the following section.

2.2.2 The contents of the mind: schemas, interpretations and perceptions

The literature review constantly pointed towards two different approaches to learning and the human mind. One is based on mental processes, mechanisms and capacities; the other is based on the contents of the mind. An example comes from Almada (2013), who even refers to two distinct brain circuits, one controlling processes and the other controlling contents. The previous section provided an overview of what has been considered in this research as the mental master process, or embodied cognition, and its sub-processes: intelligence, learning and memory. This section discusses the contents, attempting to explain how people create and organise mental representations, '*the flora and fauna of the mind*' (Sherin 2015).

A complete and detailed map of the trillions of neural connections in the body '*will be of no use without a psychological level of understanding of what those activations are doing*' (Block 2014, p. 161). Investigations focused on mental contents aim to identify how the meaning structures are formed and integrated; that is, how schemas and basic conceptual representations from internal and external stimuli interact and build complex meanings (Haynes 2006).

Investigation of mental contents is reported across different research fields. Classical views on intelligence and cognition have provided several explanations on the formation, structuration and manipulation of schemas (Salzman 2010). These

explanations usually compare the human mind with other animals, and even plants (Anastasi 1998; Calvin 1994; Carello 2012). Neurosciences and studies on consciousness also provide explanations about mental content formation and structuration (Cavanna 2014). The named *causal theories of mental content* have also been developed from a philosophical and epistemological approach (Rupert 2008; Thomas 1999). All of these views, at some point, have been in mutual influence with the computer metaphor, situated robotics, dynamical systems theory and information management systems (Morgan 2013a) – for example, the data–information–knowledge–wisdom (DIKW) hierarchy (Rowley 2007).

The DIKW theory states that meaningless *data* needs to be perennially interconnected to form more complex structures with basic significance, referred to as *information*, and that *knowledge* is the permanent interconnection of different pieces of information increasing the significance; however, ultimately *wisdom*, not developed yet by artificial intelligence artefacts (Sternberg 2005, p. 258), is the highest possible level of meaning (Rowley 2007). Wisdom it is not only what is individually known by each person but also the unique manner in which knowledge is held and used; wisdom represents the inherently human ability to sense, build and act on the personally chosen truth, reality or sense of self (Bateson 1972, p. 156; Rowley 2007; Shen 2007, p. 172). The DIKW hierarchy will be used further in this section and also in Chapter 3 as an epistemological guiding reference.

Particular views on information and knowledge were also identified. The essential nature of information and knowledge management, since it is fundamental to human existence, has been considered by many disciplines. Plato first defined *knowledge* as a justified true belief, which has been debated over the centuries by Aristotle, Descartes, Kant and others (Rowley 2007). Drawing on these debates, it has been argued that knowledge is information put to productive use, according to knowledge management and information philosophy, fields of research influenced by a variety of disciplines, including philosophy, cognitive science, social science, management science,

information science, knowledge engineering, artificial intelligence, quantum physics and economics (Rowley 2007).

Another perspective on the investigation of mental contents, information and knowledge comes from sensorial and perceptual studies (Moscovici 1980; Prieto-Gonzalez 2014; Schooler 2011; Shibata 2014; Shiffrin 1977; Thomas 1999; Whitehead 2010). These aim to explain the process by which the physical energy received by sense organs that are spread across the body forms the basis of perceptual experience (Ahissar 2004; Koster-Hale 2014; Watanabe 2015a, 2015b; Wubbolding 2009). These studies distinguish between two types of processes in perception (Ahissar 2004; Koster-Hale 2014). Bottom-up processing is also known as data-driven processing, because perception begins with the stimulus itself. Processing is carried out in one direction from the retina to the visual cortex, for example, with each successive stage in the visual pathway carrying out ever more complex analysis of the input (Gibson 1962). Top-down processing refers to the use of contextual information in pattern recognition – for example, understanding difficult handwriting is easier when reading complete sentences than when reading a single and isolated word, because the meaning of the surrounding words provides a context that helps the reader to understand (Gregory 1997). In sum, the perceptual process is bidirectional and involves different stages of meaning-making: from simple sensorial data to complex meaning structures.

Overlapping premises were found among Piaget's cognitive work on schemas, embodied cognition explanations on conceptual metaphor and blending, and studies on perception. Using the DIKW hierarchy as an epistemological guiding reference, these overlapping premises are briefly discussed in this section.

Piaget's work explains how people move from the formation of schemas in childhood to abstract reasoning in adulthood. Focused on how humans make meaning in relation to the interaction between their experiences and their meanings, he defined three

interconnected mechanisms through which schemas construct meaning. According to his schema theory, the initial order in mental representations emerge through processes of assimilation (joining concepts and adding new ones after new experiences), accommodation (reframing an existing mental representation to fit the new experience) and equilibrium (the regulating process of balancing the use of the previous two) (Piaget 1952). It is through repetition of the same experiences and new ones that these processes increase significantly in velocity and complexity during the first few years of human life, involving four stages of development (sensorimotor, preoperational, concrete operational and formal operational stages) (Malerstain 1979; Piaget 1952).

In alignment with Piaget's work, and located in the vast neo-Piagetian multidisciplinary research field of embodied cognition, the Conceptual Metaphor Theory addresses schema structuration. This theory explains that schemas represent mostly the sensorimotor experience, and that basic schemas are mapped and connected to form more abstract pieces of information (Lakoff 1993). Named *conceptual metaphors*, these abstract forms consist of simple arrangements of schemas based on comparisons among them, identifying a schema in terms of the others, from the same or a different field of knowledge, aiming to imitate the experience in turn (Amin 2015; Anderson 2003; Dreyfus 2015; Nunez 2015; Sherin 2015). Schemas are data units mirroring internal and external environments, and they represent the most basic level of learning (Amin 2015; Dreyfus 2015; Lakoff 1993; Sherin 2015).

The Conceptual Blending Theory argues that conceptual metaphors are constantly integrated or blended (Amin 2015; Dreyfus 2015; Koch 2007; Kochanska 1994). The blend represents a more complex structure where meaning starts to unfold (Dreyfus 2015). This theory is focused on describing the process of meaning construction that takes place as the mental narrative or discourse unfolds (Dreyfus 2015). Constructing meaning involves the invocation and integration of conceptual content coming from one or more different knowledge domains (Amin 2015; Dreyfus 2015).

Conceptual metaphor and conceptual blending are similar to Piaget's concepts of assimilation, accommodation and equilibrium. All these mechanisms consider schemas as basic data units, constantly forming more complex structures of meaning, which then influence new schema processing. These explanations align with the description of the perceptual process, which is bidirectional and involves different stages of meaning-making, from simple sensorial data to complex meaning structures. In this context, and considering the basic premises discussed in the DIKW hierarchy, which is that any information system has a hierarchy[1], it could be argued that basic mental schemas are data constantly mapped and blended to form a mental epistemological hierarchy.

In this thesis, embodied cognition (intelligence, learning and memory) is considered as the master mental process, a multidimensional phenomenon of meaning-making, where initial schemas are combined to form increasingly complex meaning structures, captured in an epistemological hierarchy of significance. Premises on embodied cognition and the mental epistemological hierarchy discussed above opened possibilities to investigate further how *educare* and *educere* can be joined. This is explored in more detail in the next two sections.

2.3 An overview of the study of worldviews

The focus of ESD is now shifting towards the investigation of the multiple determinants shaping the human identity. Section *1.1 The enquiry space: new challenges and opportunities in the field of the Education for Sustainable Development (ESD)* discussed how ESD is moving towards a more profound philosophical transformation based on a deeper exploration of human psychology. Attention is now placed on the inherent and exclusively human capacity that is to build, change and transform meanings. Using the same terms from section *2.1 Two disjointed educational paradigms: educare and*

[1] Where basic *data* units are compared among themselves to form more complex structures recognised as *information*, and pieces of information compared among themselves form *knowledge*, an even more complex structure requires subjective interpretation to form *wisdom* (Rowley 2007).

educere, this means that ESD is shifting away from a largely *educare* approach towards the exploration and inclusion of *educere.* Looking for new paths or mechanisms to achieve the ESD transformative aims, the literature reviewed pointed to the term *worldviews* and the study of its influence on human conduct. This section provides a brief analysis on the current literature based on worldviews.

There have been numerous attempts to conceptualise worldviews. Despite these efforts, there is not a unified explanation of what they are or how they are formed or expressed (Devlin 2010; Naugle 2002). Possible reasons for this lack of integration include the large number and variety of descriptions, mostly coming from the study of religion (Koltko-Rivera 2004; Vroom 2006), or disagreement on what these entities are, or a basic comprehension in what a worldview encompasses (Devlin 2010). The term has existed for a long time, but it has not been fully explored in any discipline (Bawden 2010; Devlin 2010). Sometimes it has been used as a synonym of scientific paradigm or culture (Bawden 2010; Harraway 2012; Vroom 2006). In her own analysis, Devlin (2010) shows how worldviews have been understood in terms of attitudes and existential questions, and as a tool for the discernment between right from wrong (Devlin 2010). She also exposes how anthropologists and historians of religion speak of worldviews with regard to beliefs and values emanating from stories, narratives and sacred texts, and the role rituals and symbols play in the formation of culture and community. Devlin discusses how worldviews have also been related to the generic terms *perspective* and *ideology;* she discusses the arbitrary and confusing use of the term in the existing literature on worldviews (Devlin 2010).

Beyond conceptualisation, there have been attempts to develop a worldviews model to gain greater clarity and comprehensiveness. In psychoanalysis and counselling, Ibrahim's (1994) work used the Scale to Assess World View to classify worldviews depending on particular combinations of perceptions about life, named optimistic, traditional, here and now, and pessimistic (Ibrahim 1994, pp. 201, 7). Vroom (2006) explored the most dominant worldviews in a comparative study explaining that

worldviews are basically divided into two main categories: secular and religious (Vroom 2006, pp. 1-2). Devlin (2010) presents a multidimensional model of worldviews which incorporates ideas about human nature, society and the environment, based on the Conflicting Worldviews Questionnaire (CWQ) (Devlin 2010). Johnson (2011) explains that the study of worldviews – their definition, assessment and classification – has been both limited and disjointed, offering a model with six basic components to define a worldview, represented at both individual and collective levels. These components are sets of perceptions named ontology (existential beliefs), epistemology (how people learn), semiotics (language and symbols to describe the world), axiology (proximate goals, values and morals), teleology (ultimate goals and the afterlife) and praxeology (proscriptions and prescriptions for behaviour) (Johnson 2011, p. 137).

The most recent model identified in the literature emerged as the most significant for this research, due to its integrative nature. As discussed in section *1.2 Research questions and methodological design*, Hedlund-de Witt's model (2014) not only defined worldviews with a clear conceptualisation of its components; it also provided a typology of dominant types of worldviews and a tool to identify them. After analysing literature on the ultimate goals and challenges of ESD, *educare* and *educere* approaches to education and learning; multidimensional and transdisciplinary theories on embodied cognition; and comparative explanations about the formation of mental contents, Hedlund-de Witt's work emerged as a possible point for theoretical convergence (Hedlund-de Witt 2012, 2014b, 2014a).

According to Hedlund-de Witt (2014) worldviews are the '*inescapable, overarching systems of meaning and meaning-making which substantially inform how humans interpret, enact, and co-create reality*' (Hedlund-de Witt 2014b, pp. 40-1). In her work, a worldview is a complex constellation of '*ontological presuppositions, epistemic capacities, and ethical and aesthetic values that converge to dynamically organize a synthetic apprehension of the exterior world and one's interior experience*' (Hedlund-de Witt 2014a). Worldviews are an integration of five fundamental meaning systems:

ontological (about nature, reality, the universe and the divine), epistemological (about what we know and how we know it, how can we gain or build knowledge, what is valid knowledge), axiological (about values, ethics and morals, what is good and what is bad, what life is all about), anthropological (about who the human being is and what their role and position is in the universe, who or what is the human being, what is the role and purpose of human existence) and sociological (about how society should be organised and how societal problems and issues should be addressed) (Hedlund-de Witt 2014b). In her work, Hedlund-de Witt argues that worldviews consist of foundational perceptions '*regarding the underlying nature of reality, proper social relations or guidelines for living, or the existence or non-existence of important entities*' (Hedlund-de Witt 2014a). In her model, she explains that, depending on how perceptions combine, worldviews can be classified into four major families or categories of worldviews: traditional, modern, postmodern, and integrative (Hedlund-de Witt 2014a).

The literature review in this research focused on exploring how to create and express different ways of being, becoming and behaving, and how to encourage this task from an *educere* perspective of educational practices. This study identified this set of optional ways to exist as human potential, and Hedlund-de Witt's model represented the mental place where this unlimited potential is hidden. Her conceptualisation of what a worldview is emerged as the theoretical point of convergence encompassing the complexity and wholeness of the human mind; it is also the transdisciplinary intent of this thesis.

Other studies somehow related to the purpose of this research project (focused on the transformation of unsustainable ways of being) were those based on the self-regulation of consciousness and identity (Abrams 1989; Holvenstot 2012; Schlitz 2010; Wiher 2014), the importance of changing our worldviews while ageing (Schlitz 2011), the interplay between science and religion (Orr 2006), and the changes of worldviews through human evolution (Schilders 2009).

A fuller understanding of the nature of worldviews could translate into multiple research and practical benefits across various fields. Essentially, it could provide useful elements for individual and collective identity conflict management, where differences arising within one's own worldview or among differing people's worldviews could be identified and ameliorated (Devlin 2010; Koltko-Rivera 2004; Schein 2015). Changing one's own worldview is very difficult (Devlin 2010; Koltko-Rivera 2004); '*there is no decision procedure, no way of demonstrating that one [worldview] is true and the other false, or that one is superior to the other'* (Devlin 2010, p. 6). It is suggested that worldviews are often so diverse and deeply ingrained that they are simply mutually incompatible (Devlin 2010; Ibrahim 1994). These worldview differences can lead to conflict at different levels, like unstable personal narratives or identity (Koltko-Rivera 2004), or courses of action to be taken regarding sustainability (Devlin 2010), to mention some examples. When this occurs, the challenge is how to best manage these worldview differences and probable conflict.

A successful approach has been to help individuals gain some insight and to encourage self-reflection into the nature of their biases, with the hope that they can then engage in exploring and building more coherent personal narratives (Hand 2012; Holvenstot 2012; Koltko-Rivera 2004; Schein 2015; Schlitz 2010, 2011; Wiher 2014). This does not always work, but it is a first step in resolving the underlying roots of the unsustainable tendencies of human existence (Devlin 2010; Patel 2008; Schein 2015; Schlitz 2010; Van Opstal 2013; Wiher 2014). Those who embark on this strategy are faced with the immediate challenge of defining precisely the nature of their own worldviews, with little or no means of assessing the many conceptions that can be found in the literature. Little progress can be made without a more comprehensive way of conceptualising worldviews and a reliable way of exploring them.

2.4 The identification of the transdisciplinary gaps and the contextualisation of the research questions

This chapter presents a review of the literature, which helps to identify the complexity of the enquiry space where this research sits. As shown in Figure 3 below, this process involved revision and critical analysis of multiple theories from diverse fields of knowledge. This final section contextualises the gaps where the focus of theoretical and empirical research efforts is placed. As will be observed, these are transdisciplinary gaps – spaces for potential contribution where research from a wide range of disciplines converge. Hence, this doctoral investigation is defined as a transdisciplinary research process.

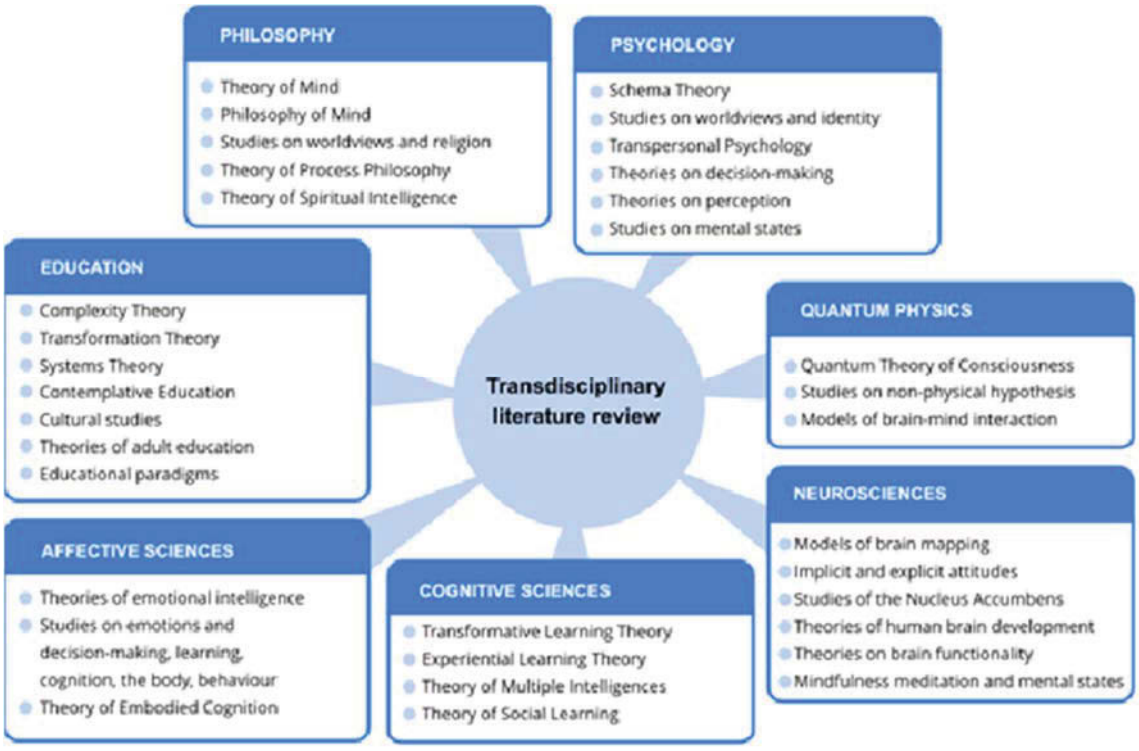

Figure 3. A description of the basic thematic structure of the literature review.

Considering the ultimate goals and challenges of ESD, which are to gain a deeper transformation of the self and the meaning of human existence in order to change unsustainable behaviours, the literature analysed in this chapter showed:

1) An *educere* approach to educational conceptualisations and practices is needed, but this educational paradigm has not been a priority in research or practice; therefore, a better comprehension of mechanisms to encourage this view is required.
2) At its core, the *educere* approach involves the gradual process of self-exploration of the inner capacities and the self-recognition of one's own potential, embracing the idea of freedom of choice and expression of built meanings (given to the self, others and the world). Mechanisms to encourage introspection and self-reflection are needed.
3) The investigation of how meanings are formed and acted out (expressed) through everyday behaviours opened up a wide range of disjointed premises about cognition, intelligence, learning and behaviour. Embodied cognition emerged as the integrative approach to the study of mental process and contents, and their role in shaping behaviours (interactions between the body and the environment). The contribution of embodied cognition to an *educere* approach is not yet clear enough, and further exploration is required.
4) The inner capacities and one's own potential (formation and expression of meanings), as explained by embodied cognition, seem to be enclosed in personal worldviews. However, there is not a unified explanation of what worldviews are, or how they are formed or expressed. There is no empirical evidence on the self-exploration and self-recognition of personal worldviews.

These four main gaps, identified through the literature review, shaped the research questions in this doctoral study:

1) Exploring what sits behind the wide range of (unsustainable) human behaviours opened up a vast and disjointed amount of research, so **how can the main disciplinary premises explaining the origin and unfolding of the behavioural process be integrated?**

2) Even having a transdisciplinary and integrated explanation about how the behavioural process unfolds, the key element is that the depths of the worldview might be enclosing the transformative potential, so **what is the relationship between worldviews and the behavioural process?**
3) A clear explanation of how worldviews are formed and shape behaviours would only be relevant if people are able to identify it and own it, so **what happens when people are asked to self-recognise their personal worldview?**
4) From an *educere* perspective, it is necessary to identify those experiences contributing to the formations of worldviews, so **what are the most significant life experiences forming and transforming a personal worldview?**

As mentioned at the beginning of this chapter, '*only recently'* have worldviews been recognised as fundamental elements to address the global threats to the continuity of human existence (Van Opstal 2013, pp. 687-8). There is visibly growing interest in understanding how people build their own sense-making, and in tracing the stages people go through in order to conform personal assumptions that underlie experiences and choices independently from dominant paradigms (Hackmann 2012, pp. 17, 21; International Social Science Council 2013, p. 33; International Social Science Council 2014). It is becoming more evident that, beyond scientific and political paradigms, the way people interact with nature and the world is basically controlled by their own perceptions of humans, the self, the others, nature and the world (Gomes 2012, p. 1066).

It has been argued that nothing less than a '*revolution'* in education is needed to confront the challenges posed by global threats (O'Brien 2013b, p. 49). Education today requires far-reaching changes in the way it is often conceived and practised (United Nations Educational Scientific and Cultural Organization 2009, p. 2). However, this '*revolution'* has been named as **the** challenge of our time due to the natural resistance to explore individual and collective assumptions, which often involves

confronting existing priorities, interests, habits and loyalties that can be threatened by processes of change (O'Brien 2013b, p. 50).

It has been argued that ESD needs to shift its focus and expand to explore, and eventually transform, worldviews:

> *Nudging sustainable behaviours which changes the environment in such a way that people change their behaviour, but it doesn't change people at any deeper level in terms of attitudes, values, motivations, etc. (O'Brien 2013a, p. 3).*

However, it is not clear how to encourage worldview transformation. An even more significant gap was identified in this literature about the lack of common understanding (theories, models or frameworks) of what exactly worldviews are, how they are formed and expressed, and what it means to change or transform them.

The intent of this thesis is to address these challenges by constructing a more comprehensive and integrated worldviews framework. This will serve the purpose of gaining an understanding of the conceptual and empirical strengths and weaknesses of the implementation of a worldviews approach to learning – particularly its usefulness in the *educere* context of ESD.

2.5 Summary of chapter

The literature review of this doctoral study started with a general exploration of the main challenges that the field of ESD faces today, using an *educare/educere* approach. Then, it expanded with a robust examination of the main theories related to the human mental capacity to learn, and how learning influences ways of being, becoming and behaving – recognising such unlimited ways as human potential. Worldviews became an element of outstanding interest due to the enclosure of human potential; the literature on this topic was also analysed.

This chapter showed how the process of a literature review gradually identified worldviews as a promising concept; it is potentially useful to explore further the human transformation sought by the ESD community. The interlinkages between worldviews and learning became the key research elements, including how learning shapes human potential in unlimited ways. The exploration of the broader and deeper context of ESD gave rise to four research questions focused on the interconnections among worldviews, learning and the transformation of unsustainable forms of existing.

CHAPTER THREE: The Transdisciplinary Framework on Worldviews and Behaviours (TFWB)

'To change our world we have to start by changing our mind, and this depends upon first gaining a thorough understanding of how the mind works'

Geshe Kelsang Gyatso

This chapter presents the Transdisciplinary Framework on Worldviews and Behaviours (TFWB) as a critical synthesis and integration of the literature reviewed in Chapter 2. In essence, this framework seeks to answer the first and second research questions:

How can the main disciplinary premises explaining the origin and unfolding of the behavioural process be integrated?

What is the relationship between worldviews and the behavioural process?

The TFWB is a theoretical outcome of this doctoral research project and has been published in an international peer-reviewed journal (De la Sienra 2017).

This study was guided by a transdisciplinary approach to research, as discussed in section *2.4 The identification of the transdisciplinary gaps and the contextualisation of the research questions*. A transdisciplinary research process often involves the development of tailored conceptual frameworks and particular clarity around the definition of key terms and their relationships. Indeed, Carew (2010), Bammer (2006) and other renowned authors (Brandt 2013; Max-Neef 2005; Nicolescu 2012) have argued that a particular challenge of a transdisciplinary research project is the development of its own theoretical approach and methodology specifically designed to address the particular and usually highly complex problem selected for investigation (Bammer 2006; Carew 2010). The main argument for this focuses on the need to reconcile and integrate different research approaches and outcomes that sit on fundamentally distinct ontological and epistemological bases (Bammer 2006, p. 95;

Carew 2010, p. 1147). Authors like Mitchell et al. (2009, 2015) and Pohl (2008) affirm the feasibility, and even the requirement, of an optimal alignment among all the philosophical elements that converge in a transdisciplinary research project (Mitchell 2009; Mitchell 2015; Pohl 2008, p. 411). The framework presented in this chapter provides both the foundation for that alignment in this thesis, and a consistent language that is adopted throughout.

The TFWB integrates and synthesises insights and overlapping premises from embodied cognition, learning and worldviews research. The framework is a distinct contribution because it provides a clear explanation of how worldviews are formed and expressed; it positions Hedlund-de Witt's model as a means for making the connection between mind and behaviour, which provides new intervention points.

3.1 Introduction to the TFWB

Two elements became crucial in the integrative process of the TFWB: a focus on behaviours and a focus on worldviews. The analysis of the literature reviewed in Chapter 2 exposed the convenience of considering an *educare/educere* approach to education in order to distinguish where the main areas of opportunity for the transformation sought by Education for Sustainable Development (ESD) are located. Chapter 2 also discussed embodied cognition as an integrative approach to learning and behaviour, where the vast and disjointed literature related to what sits behind human behaviour converged in a revolutionary way. Embodied cognition was represented as a broad umbrella where behavioural theories based on developmental psychology, consciousness, sociology, anatomy and learning perspectives merge. In addition, Chapter 2 reflected on the potential benefits of using worldviews as a framework for bridging all the elements of interest for this investigation: ESD transformative goals, *educere* practices (i.e. introspection and self-reflection), learning as meaning-making, and behaviour as meaning expression. In this chapter, all these

premises are integrated into a transdisciplinary model explaining how worldviews are formed and expressed throughout the unfolding of the behavioural process.

3.1.1 A focus on behaviours

Human behaviour is a complex phenomenon that has been studied for centuries and from multiple perspectives. Particularly, during the first half of the 20th century, the most common view on human behaviour, popularised by several religious doctrines and scientific theories like Radical Behaviourism (Jackson 2015; Raina 2011), was based on the idea that human behaviour is the resulting expression of inner forces (needs, drives and impulses) often operating below the level of consciousness (Illeris 2009). However, in the second half of the century, findings about the strong influence that context and environment have on an individual's behaviour became evident, suggesting that human behaviour is produced by both: internal and external factors, in a continuous and reciprocal interaction (Adolphs 2003; Bandura 1971; Sommer 2011).

Actual literature about human behaviour shows that it cannot be explained by a single discipline. Indeed, it has been argued that understanding human conduct requires both genotypic studies (genetic, neuroscientific, biological research) and phenotypic studies (anthropological, sociological, psychological research) that meet in a transdisciplinary way. A transdisciplinary approach to human behaviour would provide integrated evidence about what types of mechanisms give rise to its uniqueness (Varki 2008), characterised by the ability to become aware of one's own existence and give specific meanings (Palmer 2001b; Varki 2008). As discussed in Chapter 2, embodied cognition represents the complex, vast, disjointed and contradictory field of research that aims to integrate genotype and phenotype studies on learning and behaviour. In addition, the nascent theory of the Interpersonal Biology of the Developing Mind (IBDM), where the body, brain, emotions, neural and social connections are discussed (Siegel 2001, 2012), forms a transdisciplinary approach to the human mind and behavioural responses.

There is a range of definitions of human behaviour (Ingham 1999, 2000). In this research project, Park's (2007) concise definition is adopted because of its clarity and relevance for the purpose of this study. He argues that the way people behave is the physical (embodied) representation of personal worldviews, being ordered compilations of the most basic conceptual schemes (Park 2007). The TFWB focuses on behaviour as the ultimate expression of the human embodied mind where the worldview is formed.

A large amount of literature focuses on causes, evolution, expression, measurement, modelling, training and change of human behaviour. This is underpinned by a vast variety of definitions, methods, models, approaches and theories. In many cases there are visible contradictions, disagreements and unanswered questions in the literature; however, the TFWB presented in this chapter builds upon some of the most referenced and cited postulates on embodied cognition and worldviews, as discussed in Chapter 2.

3.1.2 A focus on worldviews

The TFWB is an attempt to fuse leading academic research from diverse disciplines, ontologies and epistemologies into an original and transdisciplinary explanation. The leading academic research identified in the literature is directly and indirectly linked to human behaviour: genes expression, neural connections, social relationships, learning approaches, educational paradigms, dichotomies in historical conceptualisations, among many others. The original and transdisciplinary explanation was constructed by taking the specific definition provided by Hedlund-de Witt (2014) of the term *worldview* (Hedlund-de Witt 2014b, 2014a) as the starting point. This definition allowed the expansion of the significance of the TFWB as a theoretical reference.

Worldviews surfaced as a possible point of convergence for all the diverse elements mentioned above. The term became a powerful adhesive, bringing together apparently

distinct and contrasting premises from different academic fields but with a behavioural approach. By bringing together all these distinct issues which are actually highly interconnected, the TFWB became a transdisciplinary explanation of not only what causes and shapes human conduct but also how behaviours originate and unfold. The use of worldviews as the bridging concept allowed the construction of an explanation about how people sense and apprehend the world, and assign meanings to it, shaping not only patterns of behaviour but also patterns of emotion and thought, prescribing each interaction within oneself, others and the world.

3.2 The five layers of the TFWB

The TFWB is represented in Figure 4 as a layered structure made up of five distinct and interconnected layers. This framework connects the neurological dimension of an individual, which gathers data about oneself and the surrounding environment (layer 1), with the mental dimension, where such information is interpreted and interwoven into a worldview – a complex and hierarchical constellation of meaning (layer 2). The TFWB then depicts how such meaning is translated (layers 3 and 4) into the wide range of possible behaviours a person can display (layer 5).

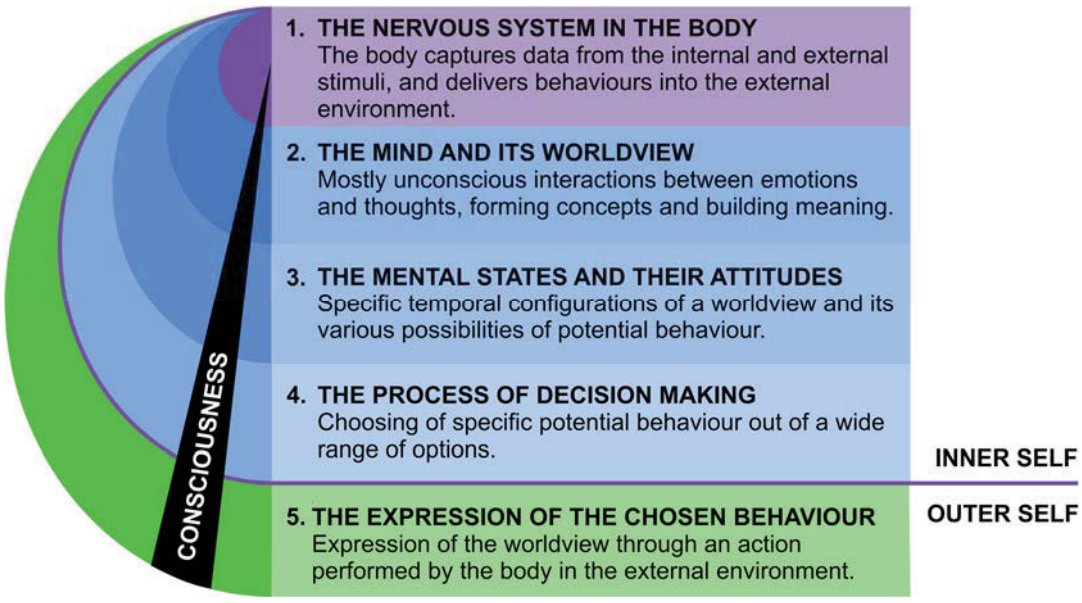

Figure 4. The Transdisciplinary Framework of Worldviews and Behaviours (De la Sienra 2017).

This diagram displays five nested and interdependent layers. Each layer represents an increase of possibilities in comparison with the adjacent layer on the inside; this means that anyone can display a wide range of behaviours even when exposed to the exact same stimulus (Greenfield 2002; Koch 2007). Instead of a linear relationship, the onion represents what Ingham (1999) explains as an increasing variety in the extent to which each of us perceives and responds to the same (or different) experiences and opportunities in life (Ingham 1999, 2000). It also represents an increasing possibility of gaining consciousness about the worldview or its expression through behaviours.

The five layers are holistically integrated as they operate back and forth from the core to the outside of the onion, a complex dynamic that is described in the following five sections, where each layer is represented by a heading with its number and name.

3.2.1 Layer 1: The nervous system in the body

This first layer honours the integrated work of the whole nervous system. From an *educare* perspective, it is the human brain that has been considered the fundamental source of our deepest self or identity (Spencer-Oatey 2007). The framework presented in this chapter, based on an embodied cognition perspective, conceives of the brain and the body as inherently joined elements not able to exist separately (Lancaster 2013). Thus, layer 1 argues that it is the whole neural complex of brain and body that makes it possible to compute all the data gathered from inner and outer environments, and to form identity.

The first and core layer of the TFWB represents the integrated work done by all the neural components distributed across the entire organism (the nerves in the body or peripheral nervous system, and the spinal cord and the brain in the central nervous system). As soon as the gene expression commences and the foetus starts developing the nervous system, multiple senses (Prieto-Gonzalez 2014) detect stimuli from the inner environment (like somatic sensations, sugar concentrations in the blood, or heartbeat acceleration) and from external sources (like the sounds in the womb),

activating trillions of neural connections and initiating the sensory transduction, to compute all data gathered (Greenfield 2002; Hawrylycz 2014; Northoff 2006).

There is an ongoing discussion about the number, limits and classification of the human senses (Prieto-Gonzalez 2014) that have resonance with the limitations of our current capabilities or multiple intelligences, which is significant to this work (Friedman 2005). Another open debate relates to the range of hypotheses proposing details of how stimuli and neurons interact; Chapter 2 discussed three possible explanations, including the quantum approach to life (Beck 1998; Gardiner 2010; Gennaro 2007; Georgiev 2015; Greenfield 2002; Koch 2007; Meijer 2014; Sanchez-Canizares 2014; Tarlaci 2010).

Regardless of the ongoing studies above, each individual's genotype expresses in a unique way due to multiple influences, both genetically and environmentally (Abeyta 2004); hence, the computation of the information gathered by the senses is a common neural process shared among humans but differentiated in each and every individual.

The core layer of the TFWB graphic alludes to the whole nervous system spread across the entire body as the organic structure designed to gather and compute data from the internal and external environments in a unique way for each individual. Table 1 summarises the key premises arising from this layer and establishes the link between these premises and some of the most relevant literature sources. The principles presented in the discussion of each layer encapsulate the main findings arising from the TFWB, which will be referred to throughout this doctoral thesis.

Table 1. Key premises from the TFWB and its connection to the literature, layer 1

Key premises from layer 1:
• The whole embodied nervous system is greater than the sum of its separated parts, especially when it comes to gathering and computing all the data obtained by the multiple senses and receptor organs, from both the internal and the external environments.

• The unique interaction between the genes of an individual and the environment where the individual is located gives rise to a unique nervous system working with personalised neural patterns of cellular connections with differentiated strength and extension.
Main sources of literature:
• Theories of human brain • Theories on brain functionality • Studies of the *nucleus accumbens* • Models of brain mapping and magnetic resonance imaging • Theories on learning, embodied cognition, and behaviour • Models and theories of intelligence

Based on the evidence presented above, the TFWB assumes that human behaviour initially depends on the conformation of the nervous system (Zador 2014) and its interaction with the internal and external environment. Subsequently, the whole embodied neural machinery gives rise to the mind and '*experiences are reflected in the strength and extension of neural connections and it is this process, whereby connections so exquisitely mirror what happens to us'* (Greenfield 2002, p. 91). Although there is not yet clarity in the literature about how the nervous system forms the mind, the next layer provides a possible theoretical approximation to this phenomenon based on the emergence of a worldview.

3.2.2 Layer 2: The embodied mind and its worldview

The second layer of the TFWB becomes a theoretically possible integrated explanation of how the embodied mind and its worldview are formed. Limitations of current empirical research methods to further explore the human nervous systems and the mind imply that exactly how the former creates the latter is not yet clearly understood (Bryant 2007; Hawrylycz 2014; Siegel 2001, 2012). For example, the restriction of non-invasive techniques '*which cannot capture the brain's activity at a neural level*' in quantitative research (Hawrylycz 2014, p. 13), or the impossibility to standardise subjectivity in qualitative research (Bryant 2007; Siegel 2001), have limited the study of how exactly neural connections form the mind and its worldview. However, following

up from the discussion on the process and the contents of the mind in section *2.2 Learning premises where educare and educere can be joined*, this second layer suggests a theoretical approximation to this phenomenon of the embodied construction of meaning.

The first premise on embodied cognition implies that the mind is embodied. The whole nervous system is permanently processing countless stimuli from internal and external stimuli, giving rise to the mind, the intangible and invisible platform or virtual interface (Sternberg 2005, p. 3) where all the neural connections converge (Schooler 2015; Siegel 2001). The extended mind thesis (Wilson 2015, p. 429) and the interpersonal neurobiology approach to the developing mind (Siegel 2001, 2012) argue that such neural connections occur across the entire body and not only in the brain; therefore, the mind is not constrained to the skull but extended, embodied, as shown in Figure 5.

Figure 5. Artistic representation of all the neural connections across the body (USC-Harvard 2011).

When the neural system is activated, the mind is created. The neural map, a specific pattern of neural firing in particular regions across the nervous system, serve to create a mental map, a mental representation mirroring the stimuli experienced by the body (Siegel 2001, 2012). The embodied nervous system creates an embodied mind, the platform where the mental map is contained. Following up from section *2.2.2 The*

*contents of the mind: schemas, interpretations and perception*s, where diverse discussions about the constitution of mental content were discussed, and considering Hedlund-de Witt's definition on worldviews introduced in section *2.3 An overview of the study of worldviews*, in the TFWB the mental map is conceived as a worldview. This claim is discussed further in the following paragraphs.

Recalling the contents of the mind discussed in section 2.2.2, at the initial level of information-processing, the basic and meaningless **schemas** are mapped and connected to form more abstract pieces of information named conceptual metaphors. These are simple arrangements of schemas based on comparisons among them, identifying a schema in terms of the others, from the same or from a different cognitive or leaning domain (discipline or field of knowledge), and aiming to imitate the experience in turn (Amin 2015; Sherin 2015). The next, and more sophisticated, level of computation implies that conceptual metaphors, coming from one or more cognitive domain, are constantly blended (Amin 2015; Dreyfus 2015; Koch 2007). The blend represents a more complex structure where meaning starts to develop (Dreyfus 2015); therefore, it could be called **interpretation** because to interpret is to assign meaning or to explain the meaning of something (*Oxford Dictionary of English* 2010).

The TFWB links the embodied cognition precept of conceptual mapping and blending with studies on **perceptions**, because these can be defined as complex arrangements of meaning, encompassing the identification, interpretation and arrangement of bodily sensations in order to form an inner representation of the world (Izard 2010; Schacter 2011). In other words, mapping and blending interpretations matches the definition of a perception; indeed, it has been suggested that people form levels of perception in which meaning is constantly filtered by comparing (mapping) and integrating (blending) '*incoming information and the value placed upon it*' (Wubbolding 2009, p. 50). The integration of similar perceptions from the same cognitive domain gives rise to a **meaning system**, which has been defined as a set of related perceptions constituting the lens through which individuals interpret, evaluate and respond to their

experiences and encounters, providing a fundamental sense of purpose which is vital for human existence (Ivtzan 2009; Park 2007; Silberman 2005).

Schemas, interpretations, perceptions and meanings systems can be related to the term *worldview* based on Hedlund-de Witt's definition. The term *worldview* derives from the German *Weltanschauung*, which means '*a view of the world*', including how an individual knows, thinks, feels and acts what is in the world and in her/himself (Hand 2012, pp. 528-30; Johnson 2011). It frames the relationships of oneself (endoself, or internal, inner, world) with the world (exoself, or external, outer, world) (Johnson 2011; Patel 2008). It shapes how each of us understands and interacts with ourself and with the world (Vroom 2006). A worldview is the subjective meaning given to reality, speculative and practical, explaining life experiences and prescribing patterns of responses (Hand 2012). In particular, Hedlund-de Witt's definition of a worldview includes the following premises (Hedlund-de Witt 2014b, 2014a):

- A worldview is '*inescapable, overarching systems of meaning and meaning-making which substantially inform how humans interpret, enact, and co-create reality*' (Hedlund-de Witt 2014b, pp. 40-1).
- '*The concept of worldview is generally understood to consist of foundational assumptions and perceptions regarding the underlying nature of reality, proper social relations or guidelines for living, or the existence or non-existence of important entities*' (Hedlund-de Witt 2014b),
- A worldview is a complex constellation of '*ontological presuppositions, epistemic capacities, and ethical and aesthetic values that converge to dynamically organize a synthetic apprehension of the exterior world and one's interior experience*' (Hedlund-de Witt 2014b, pp. 40-1).
- A worldview is an integration of five fundamental sets of perceptions:
    - ontological (about nature, reality, the universe, the divine)
    - epistemological (about what we know and how we know it, how we can gain or build knowledge, what is valid knowledge)

- axiological (about values, ethics and morals, what is good and what is bad, what life is all about)
- anthropological (about who the human being is and their role and position in the universe, who or what is the human being, what is the role and purpose of human existence)
- sociological (about how society should be organised and how societal problems and issues should be addressed).

In these four paragraphs, it is possible to identify that a worldview is formed by five meaning systems, where each systems includes a particular set of perceptions. Thus, in the second layer of the TFWB a worldview is defined in terms of meaning systems, perceptions, interpretations and schemas, as shown in Figure 6.

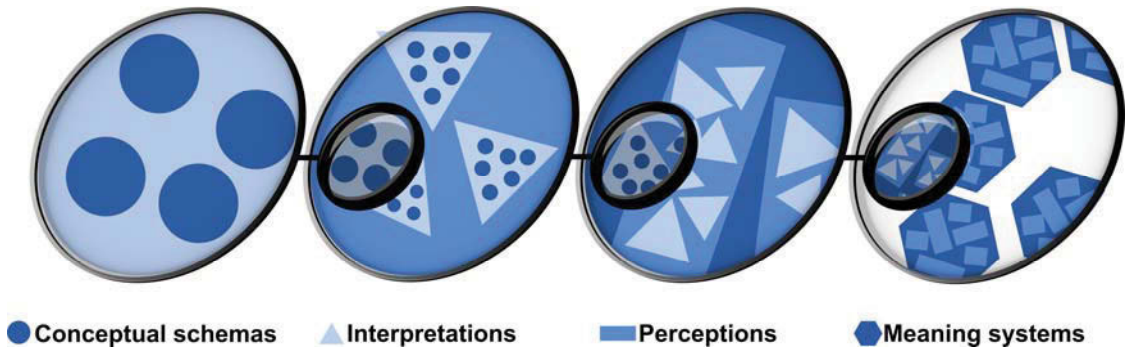

Figure 6. Diagram built to represent the meaning hierarchy in a worldview.

The proposed epistemological hierarchy in Figure 6 is a distinction not necessarily evident in the literature on embodied cognition, developmental psychology or worldviews; rather, it is an outcome of the TFWB. This hierarchy resulted from the comparison of underlying commonalities found in the discussion of mental contents shown in *section 2.2.2 The contents of the mind: schemas, interpretations and perceptions*, and using Hedlund-de Witt's definition on worldviews plus the DIKW hierarchy as an epistemological guiding reference.

Regarding the formation of a worldview, the second premise of embodied cognition establishes that the very nature of cognition comes from the details of embodiment.

More specifically, following up from section *2.2.1 The processes of the mind: intelligence, learning and memory*, this layer considers these three as the main sub-process forming a worldview, occurring simultaneously with reciprocal influence. One involves collecting, identifying and classifying data, which has been called intelligence (Anastasi 1998; Calvin 1994; Carello 1984, 2012; Conway 2015; Kan 2013; Matzel 2011). The other involves assigning meaning to and building meaning from data, which multiple authors refer to as learning (Deakin 2015; Dietterich 2013; Illeris 2009, p. 10; Kolb 2014; Merriam 1993; Mezirow 1990; Mitchell 2015; Sipos 2008; Sternberg 2005). And the third involves storing and retrieving mental contents, memory (Smallwood 2008; Squire 2015). Emotions are the central energy activating these processes, which are mostly unconscious, as the third and four premises of embodied cognition argue. Based on the four main premises identified as common underlying explanations in the literature of embodied cognition, this TFWB argues that the master process reported in the literature, as the main process forming the mind, is the same as that through which the worldview is formed.

According to the uniqueness of the nervous system previously mentioned, where each individual has personalised patterns of neural connections giving rise to a unique mind, it is possible to argue that no two individuals have the same set of schemas. Even if we could have the same conceptual basis, the process of mapping and blending would still be determined by the personalised mental processes of intelligence (information-processing) and learning (meaning-making) that each individual develops, regardless of the number and similarity of experiences someone has (Ingham 1999, 2000; Kolb 2014; Sternberg 2005), thus creating an exclusive worldview and unique experience of life.

In summary, the second layer of the TFWB represents how the nervous system gives rise to the mind, an embodied entity (Siegel 2001, 2012; Wilson 2015) where the worldview is formed. Embodied cognition is the master process where intelligence, learning and memory permanently interact, producing increasingly complex meaning structures. The meaningless schemas are constantly compared and blended, forming

interpretations (where meaning starts to unfold) and perceptions (more complex meaning structures), which are also constantly mapped and blended, forming a personal and unique worldview. Table 2 summarises the key premises arising from the second layer and establishes the link between these premises and the most relevant fields of literature reviewed.

Table 2. Key premises from the TFWB and its connection to the literature, layer 2

Key premises from layer 2:
• Each stimulus received by the senses is mirrored into a conceptual schema. Meaningless schemas are constantly mapped and blended to form interpretations and perceptions, more complex mental entities with increasing meaning. • Mirroring, mapping and blending occur by the constant interaction between intelligent processes (collecting, identifying, classifying, storing and retrieving) and learning processes (assigning meaning). • Intelligence and learning integrate a master process named cognition, which is embodied. Embodied cognition is largely dependent on emotions and occurs mostly unconsciously. The body and its emotions function as a primary constituent of cognition, rather than just serving an abstract and logical mind. • Through embodied cognition, the unique nervous system gives rise to a personalised mind and its exclusive worldview, integrated by five fundamental meaning systems. • A worldview is a unique arrangement of meaning which each person builds and lives through. It is the fundamental source of our deepest self or identity.
Main sources of literature
• Quantum Theory of Consciousness • Models of brain–mind interaction • Studies on worldviews and identity • Transpersonal Psychology • Theories on perception • Theory of Mind • Philosophy of Mind • Studies on worldviews and religion • Theory of Process Philosophy • Theory of Spiritual Intelligence • Models of emotional intelligence • Studies on emotions and cognition • Transformative Learning Theory • Experiential Learning Theory • Theory of Multiple Intelligences • Studies on artificial intelligence and cognition

The integration of the first and second layers allowed the identification of other premises regarding the drivers of human behaviour. Consequently, the following three layers explain how, according to the TFWB, a worldview is gradually expressed, unfolding into a wide range of possible behaviours a person can display.

3.2.3 Layer 3: The mental states and their attitudes

The third layer of the TFWB explains how mental states and their attitudes occur. The nervous system, the mind and its worldview are dynamic entities in a cyclical, perennial and uniquely personal interaction constantly processing information received from stimuli, and building and choosing the meaning procuring the optimal responses to the experience at hand (Adolphs 2003; Carandini 2014; Ingham 2000; Squire 2015, pp. 9-10). To understand how a worldview can be expressed into a specific behaviour, this dynamic system can be regarded as a sequence of singular moments or instants. In the TFWB, each instant shows a specific configuration of the nervous system, the mind and its worldview. This instantaneous configuration is referred to as a *mental state.* Each mental state contains the readiness to act in different possible ways, and this readiness is referred to as an *attitude*.

The complexity of a worldview reflects the complexity of the mind and the nervous system, because different neural mechanisms and connections are spread across the body, all operating independently but also in parallel. Sometimes these mechanisms and connections (and, in consequence, mental capacities) are '*described as working cooperatively to optimize behaviour and in other circumstances are described as working competitively*' (Squire 2015, pp. 9-10). In other words, there is a simultaneous rivalry and coalition between the evolutionarily simple, unconscious and automatic processes, which is largely controlled by emotions and the intermittent '*conscious deliberative general-purpose type of reasoning*' (Jack 2013, pp. 25-6), referred to in Figure 2 as *simple cognition* (fast and majority) and *complex cognition* (slow and minority), respectively. At the neurobiological level, this situation results from several

networks of neurons and synapses being in permanent tension and competing for attention (Hasenkamp 2012; Jack 2013; Smith 2015).

In order to generate the full range of human insight, in any given moment the human mind has several integrated nervous mechanisms, nervous system connections, and mental capacities, all acting together in complex cooperative and/or competitive forms (Carandini 2014). Therefore, it could be inferred that a uniquely personal worldview is expressed depending on what types of mechanisms, connections and capacities are operating in any given moment. This instantaneous configuration has been called a *mental state*, and it is what leads to a range of specific attitudes (readiness to act) (Adolphs 2003; Ingham 2000).

Each mental state corresponds to a large set of dynamic variables that are either visible and tangible, or invisible and intangible. Neural circuits, memory, attention, experience and, in turn, unconsciousness all interact in a complex way, and actively maintain a momentary representation or disposition of a particular range of actions, named attitudes. These variables are neither necessarily unique nor independent from each other; instead, they are inextricably linked in an ongoing feedback loop that alters the dynamic fluctuation among mental states from moment to moment, depending on the temporal context of stimuli during a specific experience (Hasenkamp 2012; Smith 2015). Internal and external stimuli encountered by an organism may steer the collaboration or competition of sets of variables integrating different potential mental states; the resulting state could be maintained over relatively long time frames but could also rapidly change in response to new stimuli (Salzman 2010).

A mental state can be positive or negative, depending on the emotion's valence (pleasant versus unpleasant or positive versus negative) and intensity (or arousal) (Scherer 2009; Smith 2015; Taylor 1996). One emotion with a specific valence and intensity may create a particular mental state, and the same emotion with a different valence and/or intensity may create a different mental state (Salzman 2010). Once the

mind installs the (positive or negative) mental state (in an unconscious or conscious form), the corresponding range of attitudes (readiness to act in different forms) emerges.

An *attitude* is the disposition created by all variables of a mental state working in unison, to make the body ready to act in a specific moment and in a certain way. Just like mental states, attitudes can be implicit (unconscious, occurring outside of consciousness, awareness and control) or explicit (conscious, where we deliberately think about it and report it to ourselves or others), and can determine a specific behaviour in a spontaneous or deliberative form (Fitzgerald 2014; Knappik 2015). Bradford's description of the fight-or-flight potential responses (Brown 2002b; Kennedy 2014) is an example of this range of dispositions encompassed in a single mental state. More research on attitudes come from Regan and Fazio (Regan 1977), who explored some of the most significant models by which attitudes guide behaviours from a cognitive perspective (Elliott 2015; Fitzgerald 2014; Galitsky 2013; Knappik 2015; Perugini 2005; Wilson 2000), and Lerner (Lerner 2015), who highlighted the research done in the affective perspective. These authors explored the cognitive and affective dimensions on mental states and attitudes, converging in the need to recognise their interdependence rather than the dominance of one over the other.

Despite the fundamental role of mental states in the mental stability and behavioural process, their study is incipient. More theoretical and experimental work is required to understand how these mental states or configurations of a worldview are formed, and how shifts between mental states occur. As yet, there is no unifying conceptual framework to clearly explain how the mind switches on and off a mental state, even though this process is a critical feature of human behaviour (Salzman 2010). Furthermore, recent research into mental states has demonstrated that in just one day a person can experience several types of mental states by the infinite combination of emotions and thoughts occurring continuously (Ergas 2013; Hasenkamp 2012; Smallwood 2015); yet there is not enough research on this topic.

The third layer of the TFWB depicts how internal and external stimuli constantly generate different combinations of neural connections, giving rise to different emotions and thoughts (configurations of meaning in a worldview) named mental states; it also depicts how, when any given mental state is installed in the mind (consciously or unconsciously), it creates a range of attitudes (willingness to act in specific ways). Table 3 summarises the key premises arising from the third layer and establishes the link between these principles and the literature reviewed.

Table 3. Key premises from the TFWB and its connection to the literature, layer 3

Key premises from layer 3
• A worldview is a dynamic entity constantly processing information and building meaning with the aim of procuring the optimal response to the experience at hand (set of internal and external stimuli). Such dynamism implies a sequence of singular moments, named *mental states*. • A mental state could be maintained over relatively long periods of time but could also rapidly change in response to new stimuli. • Each mental state includes a set of possible attitudes, the disposition created by all variables of a mental state working together. • From the set of possible variables, one will be chosen and performed in a spontaneous or deliberate form. • The unique interaction between the genes of an individual and the environment where the individual is located gives rise to a unique nervous system working with personalised neural patterns of cellular connections with different strength and extension. Each person experiences life in a unique way.
Main sources of literature
• Implicit and explicit attitudes • Mindfulness meditation and mental states • Studies on mental states and consciousness • Mind-wandering and attention • Stress management and mindfulness • Studies on emotional awareness

The following section explores relevant postulates about how someone chooses one specific attitude out of all the possibilities enclosed in a mental state, a process named *decision-making*.

3.2.4 Layer 4: The process of decision-making

Once a particular configuration of a worldview or mental state is installed and has created a range of attitudes or potential behaviours, the mind then needs to choose one of those attitudes and translate it into a specific and concrete action. Making such a choice implies the activation of a decision-making process, which will be described in the following paragraphs.

As discussed in section *2.2.1 The processes of the mind: intelligence, learning and memory*, the literature about the human mind usually marks the conscious and unconscious dichotomy. Sometimes named in the literature as '*two minds*' by dual-process theories (Evans 2013, p. 225), the ancestral, automatic, unconscious, simpler and faster majority of mental functioning is distinguished from the more evolved, deliberative, conscious, complex and slower rational mechanism of abstract thinking (Evans 2013). Preferences, judgements and choices have been traditionally (since Plato) associated to the latter, arguing that reasoning rules over emotions when the individual makes a decision (Haidt 2003; Lerner 2015; Pessoa 2008). However, '*a revolution in the science of emotion has emerged in recent decades, with the potential to create a paradigm shift in decision theories*' (Lerner 2015, p. 799). This revolution, as discussed also in the section *2.2.1 The processes of the mind: intelligence, learning and memory*, is centred on how emotions actually rule over reasoning, and includes the fundamental work on the moral role of emotions (Haidt 2003; Moon 2012).

Historically, as the *educare* approach to education shows, the reasoned, reflective, controlled, rational or cold cognitive system (studied by cognitive sciences) has been recognised as the maximum mental authority when it comes to decisions, neglecting the role of the impulsive, reactive, automatic, experiential or hot affective system (studied by affective sciences) (Alos-Ferrer 2014; Santos 2015). But new research on embodied cognition and affective sciences is changing the argument and recognising the power (or dominance) that emotions can have over cognition, by establishing that

the hot affective system is '*assumed to yield default responses unless intervened on by*' the cold cognitive one (Evans 2013, p. 223), '*at the expense of willpower*' (Alos-Ferrer 2014, p. 3). A postulate encompassed in what was referred to in Chapter 2 as the third main premise of embodied cognition states that cognition begins and ends in the body (not in the brain), where emotions are the central energy activating the process.

Lerner and colleagues (Lerner 2015) examined theories and models from the nascent field of affective sciences linking emotion and decision-making. Their meta-analysis included studies ranging between 1970 and 2015; they reviewed and accumulated enough evidence to elaborate a general model of affective influences on decision-making. The model describes a hierarchical process by which emotions shape decisions, as explained in section *2.2.1 The processes of the mind: intelligence, learning and memory*: emotions may directly evoke an action, or a thought with particular content, depth and motivation (Lerner 2015), and then the resulting action. This is also depicted in Figure 1 in the same section.

Other recent accounts suggest that the deliberative processes come into play only if automatic processing is not sufficient to achieve certain goals; this means that the automatic (hot) and controlled (cold) processes interact in a sequential way (Alos-Ferrer 2014). In other words, decisions are made in a hierarchical manner; more generic choices between competing or exclusive activities (like the fight-or-flight response) are made before more specific selections of a particular action (like scream or run, respectively) (Kennedy 2014, p. 199). Emotions regulate the intensity of an escalating state of arousal, motivation or drive, in a graded manner according to its level of activity (Kennedy 2014, p. 207), where rational thinking seems to come as a secondary assessment of the opportunities.

As discussed in the four premises of embodied cognition in Chapter 2, studies on decision-making overlap with studies on consciousness when affirming that choices can fluctuate into the stream of consciousness (Almada 2013; Kennedy 2014; Lerner

2015; Santos 2015; Schooler 2015; Smallwood 2008; Smallwood 2015; Smith 2015; Yip 2013). Controlled or conscious choices can be automated, like driving (which requires a great deal of conscious effort from novices and becomes a set of automatic skills for experienced drivers), but automatic choices can also emerge from a previous highly-rational process of deliberation (automated rationality), where there is little conscious deliberation about a highly-rational decision; for example, when decisions are made by paramedics or fire-fighters regarding the salvation of a human life (Alos-Ferrer 2014).

The fourth layer of the TFWB represents the activation of a decision-making process when the mental state elaborates a range of possible attitudes to respond to a particular stimulus, and the mind chooses the optimal attitude and translates it into a concrete action or specific behaviour. Such a process is a highly emotion-dependent human feature, and fluctuates into the attentional continuum between unconsciousness and meta-consciousness. Table 4 summarises the key premises arising from the fourth layer and establishes the link between these premises and the most relevant sources from the literature reviewed.

Table 4. Key premises from the TFWB and its connection to the literature, layer 4

Key premises from layer 4
• Once a particular mental state is installed with its range of attitudes (readiness to act in different possible forms), the mind chooses the optimal attitude and translates it into a specific behaviour. • Making such a choice implies the activation of a decision-making process, a highly emotion-dependent (embodied) human feature, fluctuating in the stream of consciousness, even at the expense of willpower.
Main sources of literature
• Theories on decision-making • Models of emotional intelligence • Studies on emotions and decision-making, learning, cognition, the body, behaviour • Theory of Embodied Cognition • Studies on mental states and consciousness • Mind-wandering and attention

Once the mind chooses a concrete action or specific behaviour, then the mental state, representing a particular configuration of the worldview, becomes expressed through the body, to interact with the environment in a specific form. This final stage in the behavioural process captured in the TFWB is described in the following section.

3.2.5 Layer 5: The resulting behaviours

As explained in section *3.1.1 A focus on behaviours*, the literature shows a wide range of definitions of human behaviour (Abrams 1989; Adolphs 2003; Clayton 2010; Ergas 2010; Ergas 2013; Hurst 2013; Ingham 1999, 2000; Jackson 2015; Manning 2009; Raina 2011; Silberman 2005; Sommer 2011).The TFWB argues that human conduct is the most physical representation of personal worldviews (Koltko-Rivera 2004; Park 2007; Schein 2015). Behaviour is the resulting physical action of someone's body, chosen from a set of different attitudes generated by the dominant mental state. A mental state is a momentary representation of the person's worldview, the hierarchical constellation of meaning given to the mentally mirrored stimuli perceived by the senses. Classic views on behaviour consider that its ultimate intention is the survival and adaptation of that organism to the ever-changing life experiences (Stern 2000); however, at this moment in human history, maybe the survival and adaptation of humankind is more dependent on people's ability to restore the peace of all minds and to develop deep and long-lasting empathy, than anything else (Krznaric 2014).

In this work, all the elements that are required to execute the behavioural process, a perennial transaction between one's body and external environment, which happens over and over again every second of human lives, are considered to be provided by a uniquely personal worldview. Such a mental construct determines behaviours through a complex process of sense-making and meaning-building. In this process, stimuli from internal and external environments are mentally mirrored, forming schemas. These mental units are constantly mapped and blended, forming interpretations and perceptions; they are also constantly mapped and blended, forming more complex

meaning systems. Then, depending on the experience at hand, a momentary configuration of the worldview leads to a range of potential behaviours, named *attitudes*; after a process of decision-making, one attitude is selected to be acted out in the external world.

The graphical representation of the TFWB in Figure 4 marks behaviours as the most external layer, separated by a boundary (thin line) that divides the inner self from the outer self. This line distinguishes the internal and external worldviews; it means that behaviours occur in the context where the individual is located. Analogous to Freud's iceberg model of human behaviour (Curtis 1991), this layer equates to the tip of the iceberg – what is observable. In contrast, the previous four layers belong to the internal world of a person – below the water surface and invisible to the human eye. Behaviour is predominantly context-dependent, which means that people choose (unconsciously, consciously or meta-consciously) to behave depending on the interpretation made by the worldview of the circumstances provided by internal and external stimuli, with the primary intention to survive, adapt and continue to live (Stern 2000).

The five layers are holistically integrated as they operate back and forth from the core to the outside of the onion, which means that the stimuli captured by the nervous systems prompt a set of possible behaviours; then, the actual behaviours impact the context, where new stimuli will be produced and perceived. The fifth layer represents the permanent interaction between the person and the context, community or culture, including, predominantly, the influence of other people's behaviours and worldviews. In other words, an individual's worldview and behaviours are shaped to a very large extent by the behaviours and worldviews that the individual creates and/or encounters in their own personal journey (Koltko-Rivera 2004; Siegel 2001). Table 5 summarises the key premises arising from the fifth layer and establishes the link between these premises and the most relevant sources from the literature reviewed.

Table 5. Key premises from the TFWB and its connection to the literature, layer 5

Key premises from layer 5
• Once a particular attitude has been chosen, the correspondent behaviour is expressed in the physical context where the person is located, which simultaneously shapes the worldview. • Behaviour is the most physical representation of a uniquely personal worldview. We choose (unconsciously and consciously) behaviour depending on the interpretation made by our worldview of the experience in turn, with the primary intention to survive, adapt and continue to live.
Main sources of literature
• Theories on decision-making • Models of emotional intelligence • Studies on emotions and decision-making, learning, cognition, the body, behaviour • Theory of Embodied Cognition • Studies on mental states and consciousness • Theories on decision-making • Models of emotional intelligence • Studies on emotions and decision-making, learning, cognition, the body, behaviour • Theory of Embodied Cognition • Studies on mental states and consciousness

The transdisciplinary framework presented in this chapter aims to bring together some of the most relevant studies on multiple dimensions and aspects of human behaviour, reducing the separation among scientific disciplines. As Varki argues, '*it is time to set aside divisive and unproductive genes versus environment arguments*' and to explicate human behaviour as the transdisciplinary outcome of complex and ongoing interactions between both (Varki 2008, p. 748).

The act of perceiving and responding to the internal and external environments is overwhelmingly complex. Multiple stages of sensory processing must take place before people become aware of the world inside and around. The TFWB provides an integrated explanation of how such phenomena occur. As beautifully put by Smith:

> *… untangling this complicated web of hierarchical perceptual and regulatory interactions holds the promise of developing a more complete understanding of the healthy and unhealthy emotional mind, and may prove useful in organizing*

> *present knowledge as well as highlighting important areas of research that have thus far been neglected. (Smith 2015, p. 2014)*

3.3 The TFWB as a theoretical outcome shaping the empirical strategy

The TFWB presented in this chapter is in itself a theoretical outcome of this research, addressing two of the four research questions guiding this doctoral project; it is also the main influence of the empirical design of this study, explained in the following subsections.

3.3.1 Response to the two theoretical research questions

The TFWB presented in this chapter represents a critical synthesis and integration of the literature reviewed in Chapter 2. In doing so, the TFWB answers the first research questions shaping this doctoral research:

> **How can the main disciplinary premises explaining the origin and unfolding of the behavioural process be integrated?**

Theories on embodied cognition allowed the identification of four main premises guiding the integration process. These premises – discussed in section *2.2.1 The processes of the mind: intelligence, learning and memory* – helped integrate the biological, genetic, anatomical and physiological bases of the mind with the psychological, sociological and philosophical approaches. The four premises identified in this study helped in closing the gap between historically prevalent dichotomies like mind/body, objective/subjective, cognition/affection or consciousness/consciousness. Embodied cognition facilitated the integration of the body and mind dimensions of a person. From there, more specific studies on human intelligence, learning, memory, consciousness, emotions and behaviours, among other topics, were reviewed. The TFWB provides an integration of disciplinary premises explaining the origin (layers 1 and 2) and unfolding (layers 3–5) of the behavioural processes.

The TFWB also recognises the mental map created by the body as a worldview, a term representing the enclosure of human potential, the unlimited ways of being, becoming and behaving. This discussion addresses the second research question shaping this investigation:

What is the relationship between worldviews and the behavioural process?

The five layers explained how a worldview determines behaviours, through:

- sensory transduction, where the nervous system working at unison produces bodily reactions and emotions
- the mental mirroring of stimulus perceived from internal and external worlds
- the constant mapping and blending of schemas, interpretations and perceptions
- a specific configuration of the worldview in any given moment or mental state
- the unconscious, conscious or meta-conscious consideration of all the possibilities (attitudes) to impulsively react or reflexively respond to (as we detect as available to us in such moment) the experience at hand
- the selection of behaviour that has been perceived as the most certain or convenient (the least amount of doubt), considering the experience at hand
- the behaviour itself, a concrete action made by the body.

3.3.2 Considerations for empirical research questions

The TFWB represents a transdisciplinary tailored conceptual framework, as well as the theoretical lens through which a qualitative strategy was envisioned. As a theoretical lens, it shaped the methodology specifically designed to address the remaining two research questions from an empirical perspective. Although Chapter 4 discusses the methodological strategy in detail, this section concludes with a brief reflection on how the TFWB helped to further explore the complex enquiry selected for this investigation.

From an *educere* approach to education, which mainly evokes the self-exploration of inner potential, a clear explanation of how worldviews shape ways of being would only be relevant if people are able to self-recognise such a phenomenon. In other words, the integration of the TFWB helped identify the need to ask people about their own worldview, their own 'onion' (Figure 4). The TFWB not only revealed the need to ask:

> **What happens when people are asked to self-recognise their personal worldview?**

It also helped in formulating questions about people's perceptions, and how those perceptions could be expressed through their everyday behaviours.

From an *educere* perspective, it was also necessary to identify those experiences contributing more significantly to the formation of worldviews. That is:

> **What are the most significant life experiences forming and transforming a personal worldview?**

The TFWB made evident the need to explore personal stories, searching for those moments of evident (to the participant) meaning-making. These experiences could inform new points of intervention in more innovative educational pathways.

3.4 Summary of chapter

The TFWB provides a possible integrated explanation of what the human mind is, how it builds a worldview, and how such a unique constellation of meaning continuously determines patterns of emotion, thought and action. Further, such an original conceptual framework represents a theoretical outcome in this doctoral research, and the main reference shaping the empirical dimension of this investigation. The TFWB informed the selection of methods aiming to explore further how well people may know their own personal worldview and its fundamental role on everyday behaviours. This is discussed further in the following chapter.

CHAPTER FOUR: A qualitative design to explore worldviews and behaviours

'If you ever get close to a human and human behaviour, be ready to get confused… there's no map, and a compass wouldn't help at all'

Bjork

The theoretical Transdisciplinary Framework on Worldviews and Behaviours (TFWB) presented in the previous chapter represents the main reference shaping the empirical dimension of this doctoral investigation. This chapter first discusses the philosophical forms in which the TFWB shaped the qualitative design. Afterwards, the chapter outlines the methodological strategy created to further explore the nature of worldviews and their linkage to behaviours.

The text commences with a brief reminder from the enquiry space and the research questions presented in chapters 1 and 2. This initial section discusses the need to combine disciplinary premises at both the theoretical and empirical level, specifically tailoring research tools in order to address the complexity of the phenomenon selected for investigation.

The next section of this chapter explains how the TFWB made evident some of the underlying philosophical premises shaping the entire research project, particularly the empirical strategy. The TFWB unveiled the foundational understandings about the nature of being that guided this research journey. This part of the chapter discloses the ontological and epistemological perspectives sustaining this doctoral research. The aim of this section is to make evident the interpretive filter, the subjective lens shaping the suggested methodology.

The second half of this chapter details the methodological strategy followed in this research. The methodological considerations are presented, and how these allowed the instrumentation of data collection and analysis is discussed.

4.1 The enquiry space and the research questions

Chapter 1 presented the central motivation shaping this research; in Chapter 2 it was possible to observe how such a motivation served to deepen the investigation of worldviews; and Chapter 3 displayed the integration of overlapping premises into the TFWB. Drawing from all these precedents, it was possible to consider that transforming unsustainable ways of being, becoming and behaving, as encouraged by Education for Sustainable Development (ESD), might be a phenomenon inherently dependent on the transformation of the potentially unsustainable depths of a worldview. Consequently, the research attention was then focused on the empirical exploration of what people know about their personal worldview. This interrogative situation was represented in the two empirical research questions:

> **What happens when people are asked to self-recognise their personal worldview?**
>
> **What are the most significant life experiences forming and transforming a personal worldview?**

As demonstrated in Chapter 3, exploring worldviews represented an opportunity to articulate the complexity of the human mind and its connection to the wide range of conduct an individual can display. Premises from different disciplinary fields of research were integrated into a transdisciplinary framework. Guided by the theoretical research questions[2], Chapter 3 demonstrated that investigating worldviews and behaviours became a research opportunity for transdisciplinary integration. In

[2] How can the main disciplinary premises explaining the origin and unfolding of the behavioural process be integrated? What is the relationship between worldviews and the behavioural process?

alignment, this chapter explains a qualitative design to enable the corresponding transdisciplinary exploration of the empirical implications of the theoretical TFWB.

As explained at the beginning of Chapter 3, it has been argued that one of the main challenges in a transdisciplinary research project is the development of its own theoretical framework and the corresponding methodological strategy (Bammer 2006; Carew 2010; Pohl 2008). These instruments should address highly complex issues by enabling a more systemic, integrated and holistic response to the phenomenon selected for investigation. They should allow for going beyond the linearity of disciplinary premises, entailing the combination of ontologies and epistemologies, and thus transcending the traditional disciplinary boundaries that underpin the structure and functioning of conventional research.

In this study, the theoretical and empirical exploration of worldviews and behaviours could not have been conducted from a disciplinary approach – for example, from an exclusively neurological position, or from an exclusively philosophical realm. The highly complex existential phenomenon demanded the integration of overlapping premises from educational, behavioural, philosophical, sociological, psychological, anatomical and quantum approaches. These enquiry space and research questions required the creation of a theoretical framework and a methodological strategy that enable bridges between disciplinary boundaries. This chapter now builds upon the TFWB that was developed earlier, discussing how it uncovered the philosophical foundations guiding this research, particularly the qualitative design specifically created for this empirical investigation on what people know about their own worldviews and behaviours.

4.2 The philosophical context for interpretation

This first half of the chapter discloses the ontological and epistemological stances exposed during the integration of the TFWB. These stances not only shaped the entire research but, more specifically, defined the empirical design tailored to address the

complex enquiry space and questions mentioned above. The aim is to make evident the interpretative filter evidenced by the TFWB, the subjective influences shaping this research and the suggested methodology (Mitchell 2009; Mitchell 2015; Pohl 2008). Providing this philosophical context in advance will help to identify and acknowledge its influence in the overall research process (Mitchell 2009, pp. 4-5): from the transdisciplinary integration of the disciplinary literature into the TFWB, to the exploration of the empirical implications of the theoretical TFWB.

4.2.1 Ontological perceptions

The embodied neural connections of an individual are in permanent interaction with the life experiences such an individual is exposed to, and they constantly influence each other, as discussed in the TFWB. This mutualistic phenomenon creates a unique embodied mind, with unique meanings interwoven into a unique worldview. The embodied and unique aspects of the mind represent some of the ontological views sustaining this empirical design, where the bodily rooted subjectivity of an individual is recognised as a permanent and inescapable mental capacity, explained as follows.

Reflected in the *educare* approach to education, the modern conceptualisations of reality have mistakenly divided the perceiver or subject and the perceived or object. This, in turn, has spawned other dichotomies such as mind/body, self/other and society/nature, fragmenting the inherent interconnectedness of the world. However, based on Whitehead's Process Philosophy (Sherburne 1966) and Nicolescu's Transdisciplinarity premise about the *hidden third* (Nicolescu 2012), it could be argued that the only situation where the object exists separated from the subject is when the object is a hidden third: a moment of discontinuity in the subject's levels of reality, a lack of perception. The hidden third (unperceived object) becomes the *included middle* (perceived object) when the level of reality of the subject is increased. Equivalent to Nicolescu's levels of reality are Schooler's (2015) tripartite model on the levels of consciousness. If something is not subjectively perceived and interpreted (the

unperceived object), it is due to the lack of consciousness or meta-consciousness of the subject.

Chapters 2 and 3 argued that 95% of the mental functioning and content are unconscious and that the remaining 5% corresponds to an attentional continuum, a dynamic flow of neural energy moving between consciousness and meta-consciousness (Schooler 2004a; Schooler 2015; Smallwood 2015). More specifically, consciousness refers to the subjective status of a particular mental content (schema, interpretation, perception, mental state, attitude, choice). Being conscious of X means having X represented in the subjective experience (Schooler 2015; Smallwood 2015). Increasing levels of reality means increasing levels of consciousness, where attention unveils the hidden third, leading to the perceptions of the included middle and making it part of the subjective experience.

As explained by Carolan (2008), Whitehead rejected the fragmented and static understanding of reality in the classical or Aristotelian logic (objects as the primary substance), and the consequent ideologies of Descartes (natural events as mechanical models), Newton (universal forces and laws), and Hume (human senses and perceptions do not provide any data) (Carolan 2008). Whitehead discussed how these postulates created a bifurcation between nature and the human being. Such bifurcation (matter versus mind, known versus knower, objective versus subjective, material versus ideal) has been in place as a foundation of Western thought for centuries, and led to a fragmented and static understanding of reality, giving rise to fragmented and static ontologies (Banchetti-Robino 2011, p. 179; Carolan 2008, p. 54).

In response to the fragmentation of reality, Whitehead‘s Process Philosophy argues that the unit of reality is a process not describable in terms of the independent morphology of an object but dependent on the subjective interpretations made of it. There is no possibility of a detached, self-contained and local existence; the environment enters into the nature of each object, which is in turn another element of

the environment, in an infinitely continuous process. Whitehead's Process Philosophy gives significance to embodied, non-representational knowledge for understanding nature as an integrated process of life rather than a state of unanimated matter (Carolan 2008, pp. 51, 6; Clayton 2010). In other words, Whitehead's Process Philosophy reunites the perceiver, or subject, with the perceived, or object, in a continuous process of interaction and interconnectedness named *reality*, where objects are not static fragments but entities in continual exchange.

In alignment with Whitehead's Process Philosophy and Nicolescu's Transdisciplinarity, as two ontologies with a particular explanation of the nature of being, Chapter 3 discussed how each person experiences reality as a constant process of interaction within her/himself, with others and with the environment, and where neural connections and life experiences are in a perennial and mutual influence, mirroring such reality into the person's worldview. The TFWB portrayed the human mind as an embodied flow of energy dependent on other minds and the environment, not as an individual cerebral entity isolated in the skull (Siegel 2001, p. 69).

The ontological postulates described in this section are already reflected in the TFWB, where a worldview was defined as an inherently subjective and embodied mental creation. In this study, the individual's perception of reality is considered unique due to the specific meaning built on the experience in turn, as well as the level of reality or consciousness about such meaning. Therefore, the participants are seen as subjects with unique embodied worldviews, probably experiencing different levels of consciousness about their own worldview, in a constantly dynamic process of meaning-making and awareness. In this continuity of being, becoming and behaving, participants might navigate through different levels of reality or consciousness, sometimes failing to perceive the object (hidden third) and sometimes gaining perception (included middle), which has the potential to favour a more coherent personal narrative.

In the definition of the methodological pathway used in this doctoral research, exploring what people know about their own personal worldview represented an opportunity to identify whether participants could recognise the meanings they have built over time, and if they could see such meanings being expressed through their daily behaviours. Exploring what people know about their worldview represented an opportunity to identify levels of consciousness about the reality they have mirrored in their minds – the awareness about the meanings they have attributed to themselves, others and the environment. The task of self-recognition of an individual's own worldviews could open opportunities to expose hidden thirds, to gain consciousness and to improve the coherence of the personal narrative.

4.2.2 Epistemological perceptions.

While ontology focuses on how someone, like a researcher, understands the nature of reality and the nature of being (Anderson 1988), epistemological perceptions describe how this reality is captured, apprehended or known (Carson 2001, pp. 4, 153). These reflect the ways in which knowledge is generated and validated (Wong 2014). The bifurcation between the object and the subject explained in section 4.2.1 also permeates the wide range of epistemological stances. In this study, though, the research epistemology underlying the integration of the TFWB and the approach to the empirical data collection is that reality is a subjectively constructed experience. Qualitative research approaches were adopted as they align with this epistemological stance by enabling the exploration of the individually constructed subjectivity.

Qualitative research deals with the subjectively constructed rather than objectively determined. It involves gathering information through people sharing their experiences and the meanings they have given to them (Wong 2014). Considering the ontological perceptions discussed above, epistemological pluralism emerged as the best representation of the epistemological stance underlying this qualitative research project. It integrates objectivism and subjectivism while recognising that, although

people, nature and the world exist by themselves, reality is always mirrored as a human mental construction, as a subjective mental meaning dependent on how the individual perceives others, nature and the world (Suri 2013). It emphasises the coexistence of multiple realities, multiple forms of experiencing life (Turkle 1992). According to Healy (2003), epistemological pluralism emphasises the multiplicity of potential realities, or levels of reality (Max-Neef 2005; Nicolescu 2010, 2012), and ways of knowing them (Healy 2003), accepting the validity of multiple ways of sensing, apprehending and understanding oneself, the world and the universe (Turkle 1992). Epistemological pluralism rescues what *educere* represents, the epistemic freedom somehow diminished by the *educare* approach, particularly since the 18th century (by the dominance of more positivist approaches), emphasising the inescapable subjectivity inherent to the human condition (Healy 2003, p. 693). It argues that access to the scientific knowledge considered to be objective is, and will always be, interpreted by the subjective mind (Healy 2003). Epistemology is a matter of individual subjective practice in which issues of context, process and procedure (within the experience at hand) always take precedence (Suri 2013).

Among the epistemological pluralist positions, attempting to strike a balance between objectivism and subjectivism, constructionism becomes the salient approach represented in the integration of the TFWB. Constructionism fuses the object with the subject, as it argues that personal truth and meaning are constructed, producing mental entities (constructs) that are assembled in the mind with the aim of explaining the sensory experience of the natural world (Ackerman 2001; Papert 1991; Suri 2013).

In a more detailed look into constructionism, particularly on the bidirectional flow on energy and meaning between the sensory experience and the mind, section *2.2.1 The processes of the mind: intelligence, learning and memory* introduced the Interpersonal Biology of the Developing Mind (IBDM) as a revolutionary explanation about how patterns of communication among people influence the patterns of neural connections within the body, and vice versa (Siegel 2001, 2012). Siegel's work goes beyond the

boundaries between neurology and psychology, bringing an interesting update to the foundations of constructivism. This update is well aligned with Papert's constructionism (Papert 1991), which builds on Piaget's constructivism (Piaget 1952), by emphasising the physical interactions between the subject and the object, and the relevance of the physical context, which were not so well recognised originally by Piaget (Ackerman 2001; Papert 1991).

The integration of the TFWB was in itself a constructionist process. It shaped a methodological strategy to explore underlying pieces of other people's own worldviews. In addition to the recognition of the ontological and epistemological stances that emerged while integrating the TFWB, this chapter also discusses how such stances constituted the main influence shaping the empirical dimension of this doctoral research. The methodological choices enabling the empirical exploration of the TFWB had to allow the investigation of multiple realities subjectively constructed. The qualitative strategy specifically tailored for this purpose was required to explore the complexity of the individual and subjective worldviews in depth. Additionally, considering the lack of literature on the empirical exploration of worldviews, this qualitative design had to also be a suitable strategy for generating theory.

4.3 The methodological strategy

In this section, and complementing section *3.3.2 Considerations for empirical research questions*, it will be observed that the TFWB, as a research outcome, influenced the methodological strategy at other levels besides shaping the empirical research questions (what to look for, which type of data).

The TFWB provided the terminology about the nature of worldviews. The terms *emotions*, *thoughts*, *mental states*, *attitudes*, *behaviours*, *learning*, *uniqueness*, *reality*, *meanings* and *consciousness* – as explained in the previous chapter – and the interconnection among them help to identify the type of data needed.

By proposing a form for the connection between worldviews and behaviours, the TFWB provided a path and rationale to explore behaviours as the recognisable expression of worldviews. Furthermore, if participants could reflect on both elements – that is, their own worldview and their own behaviours – and the connection between them, then an opportunity for more awareness of the underlying meanings given to reality could be opened[3]. The TFWB helped formulate questions designed to facilitate individuals' reflections about their perceptions, and also about how those perceptions are expressed through their everyday behaviours.

The TFWB informed the need to explore personal stories in the search for life experiences where significant learning occurred. It helped recognise critical self-reflection as an ephemeral event, a mental capacity occurring in the meta-conscious state. An extended discussion of this particular phenomenon is provided in Chapter 5, particularly in section *5.2 Experiencing a more detailed self-recognition of a personal worldview, its components and expression*.

The next subsection presents the qualitative strategy needed to facilitate the exploration of the two empirical research questions:

> **What happens when people are asked to self-recognise their personal worldview?**
>
> **What are the most significant life experiences forming and transforming a personal worldview?**

[3] The fundamental premise shaping this investigation is that becoming more aware of the underlying meanings given to reality is what actually increases opportunities for a more sustainable existence.

4.3.1 Qualitative approach: Constructivist Grounded Theory (CGT)

The TFWB made evident that a worldview is a highly complex system of meaning; thus, its empirical exploration required a holistic qualitative approach able to deal with such complexity. The Constructivist Grounded Theory (CGT) became a particularly useful reference (Charmaz 2009; Vander Linden 2006) that enabled the research to deal with the wholeness of the worldview, rather than isolated aspects (e.g. emotions, thoughts, consciousness, schemas, perceptions etc.). This approach shaped the processes of data collection and analysis. The former implied theoretical sampling and intensive interviewing. The latter implied an iterative scrutiny of the concepts and categories emerging when constantly comparing data through two stages of analysis (open and axial coding).

In the broad scene of social sciences and educational research, *ethnography*, *phenomenology* and *case study* are probably among the most common qualitative research approaches. But, in this research, the intention was to explore the depths of a worldview regardless of the natural setting where the person was located, so ethnography was discarded (Kervin 2006). The focus was not on a specific culture, so phenomenology was not applicable either. Neither was a case study approach optimal, because:

a) the focus was only on the exploration of the nature of personal worldviews through dialogue (interviews), and not all dimensions of the person – that is, the individual as an integral phenomenon or entity
b) because it was considered a single dialogue with follow-up, but not a specific period of time (Kervin 2006)
c) there was not a specific problem or hypothesis (Yin 2012).

4.3.2 Methods of data collection: survey, interviews and observation

According to Kervin (2006), there are six basic steps to consider when selecting methods for data collection. The first corresponds to the identification of the '*research paradigms*' shaping the research focus and entire process (Kervin 2006, p. 105); in this study, this occurs in section *4.2 The philosophical context for interpretation* in this chapter – specifically, the qualitative research perspective and the CGT approach.

The second and third steps involve clarity on the type of data to be gathered in order to explore the possible answers to the research questions; this was discussed in section *3.3.2 Considerations for empirical research questions*. Data was identified as personal narratives encompassing what people know about the components, formation and expression of their worldviews.

The fourth step represents the selection of appropriate data-gathering techniques. This is in close connection with the fifth (sites and participants) and sixth (tools) steps. Techniques, sites, participants and tools are discussed further in the following three sections. There were three rounds of interaction with the participants, and each section below encloses each round. The first round of interaction involved an online survey. The second round occurred during a personal interview. The third round asked reflective questions to be answered online.

a) First round of interaction: an online survey

Hedlund-de Witt's questionnaire (2013) was considered the optimal tool to recruit volunteers open to self-explore their personal worldviews. Her work identifies four archetypes of dominant worldviews, and includes the corresponding questionnaire to identify such typology (Hedlund-de Witt 2014b). Answering the questionnaire produces a score that enables people to be classified into one of the four worldview types. Based on a crowdsourcing platform, she reported an extensive process of questionnaire development and standardisation. Her work stopped there, providing

foundations for a more reflexive, personal and in-depth exploration of individual worldviews.

In this research, publishing the survey online would open up possibilities for random sampling, where potential participants would be able to answer from a wide range of settings and at a time convenient to them. Potential participants could become familiar with the term, prompting an initial process of potential self-reflection on how their own worldview might look like. Obtaining a representation of each of the four types of worldviews would enrich data analysis; but this study could be still performed with less variability, since this research design is not quantitatively significant.

Between November 2015 and July 2016, more than 500 brochures were handed out on the streets of Sydney, Australia and potential participants were invited to answer the online survey, as observed in Figure 7 (see Appendix C for a close-up of the brochure).

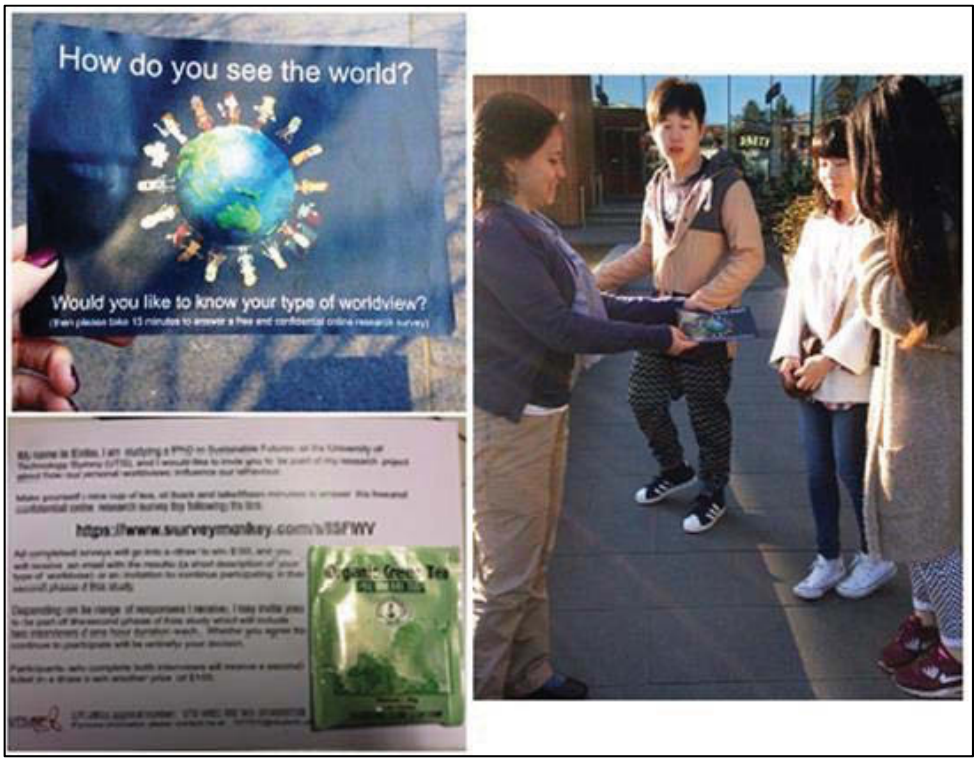

Figure 7. The brochure (front and back), handed out to a group of people on the street.

Hedlund-de Witt's worldviews survey tool was the first method of data collection chosen, as a starting point shaping the interviews. However, a shortened version of the questionnaire was used (the complete survey is provided in Appendix B). The first 19 questions were placed online, because they allowed the participants' dominant worldview to be classified. The remaining 23 questions focused on the impact of the worldview on certain behaviours, and they were replaced by the interview, as explained in the next section, *b) Second round of interaction: a personal interview.*

The first 19 questions categorised four dominant types of worldviews (Traditional, Modern, Postmodern and Integrative), with specific questions based on each set of perceptions (ontological, epistemological, axiological, anthropological and sociological). Each of the 19 multiple-choice questions had four possible answers representing each of the four types of worldviews. Participants had to type number 1 in the statement they considered to be the most representative of their identity, and number 4 in the least representative. Figure 8 shows an example of the first question alluding to an ontological (metaphysical) perception. The question was '*Regarding God, universe, the world and reality, I believe that:*' and the figure shows the four available statements to choose from. The figure is an example of someone selecting the second statement offered as the least representative, and the third statement as the most representative of their identity. The other two statements offered were left blank. Once printed, the number 1 and 4 marks were counted to identify which type of worldview received more 1s and which one received more 4s, as the most dominant and least dominant types of worldviews resulting from the survey. In this figure, the second statement corresponds to the Modern type of worldview (least representative) and the third statement to the Postmodern type of worldview (most representative).

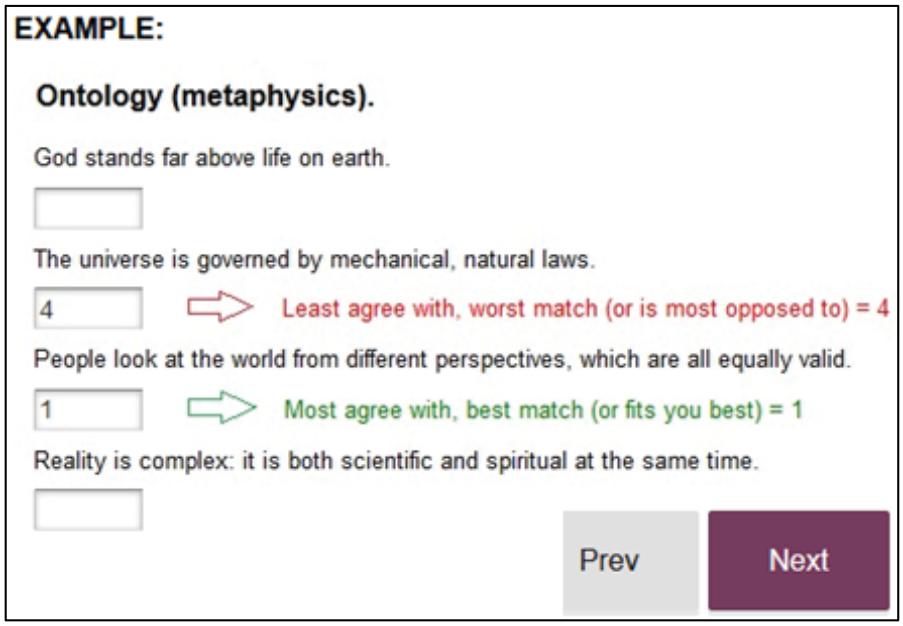

Figure 8. Instructions given to participants in the online survey.

A 20th open-ended question was added, aiming to capture an initial reflection potentially emerging during the completion of the online survey. The survey would take between 15 and 20 minutes to complete.

b) Second round of interaction: a personal interview

In the original questionnaire, the second set of 23 questions identified sustainable and unsustainable aspects in the participant's lifestyle choices (type of transport, consumption of food and energy, disposal of waste, among others), influenced by the person's worldview. In this study, the second set of questions was replaced by a more reflexive, personal and in-depth exploration of worldviews. The central interest was to listen to personal narratives where participants spontaneously exposed their ability to self-recognise and reflect on how their own worldview influences their everyday life.

In the CGT approach, where the purpose is to explore data and find commonalities to create the foundations for potential theory building, the most common collection techniques are observation and interviews; these were selected for this study because they align with the type of data sought in this project.

- **Observation**

Observation occurred specifically during the interviews and not in an ethnographic form. In addition to the online survey and the interview, observational notes taken during and immediately after the interview also represent a tool used to gather data (Kervin 2006). These observations paid special attention to facial expressions and body language (Russell 2008; Russell 1994; Van Den Stock 2007) as significant sources of confirmation of emotions being expressed. Visual indicators of certainty/uncertainty and satisfaction/dissatisfaction were identified – for example, the occurrence or lack of smiling and direct eye contact; a kind, vocal tone similar to greeting (satisfaction and certainty); the shape of the middle of the lower forehead; and the position of the arms (Barger 2006; Dimatteo 1980; Koros 2012; Sporer 1995).

- **Sampling and location**

In a period of nine months, more than 500 brochures were handed out, 80 people logged into the online survey, and 54 completed the whole questionnaire, resulting in 25 successful interviews (11 women and 14 men). Using the number in the list as they registered in the online survey, and the initials of their first name, a particular nomenclature was created, to protect participants' identities.

Participants were invited to an individual (one-on-one), semi-structured interview. This format was chosen over other forms of interviews (e.g. structured, unstructured) or focus groups, in order to guarantee the intimacy of the conversation (Boyce 2006; Kaplowitz 2000, 2001; Kervin 2006; Stokes 2006).

The 25 participants selected for interviews were offered a location close to where they were regularly located or which was more convenient for them. Preference was given to open, natural, quiet outdoor spaces, aiming to foster a sense of comfort and inspiration. On some occasions, the facilities of the University of Technology Sydney were selected by the participants.

Interviews were conducted until saturation point, where new narratives no longer brought new information. Theoretical sampling and constant comparison were applied (Charmaz 2009; Higginbottom 2014). Between one interview and the next, observation notes, initial transcription of the recorded audios[4], as well as basic identification of broad topics covered were performed, allowing simultaneity between both methods and saturation (discussed further in section *4.3.3 Methods of data analysis: open and axial coding*). Additionally, the literature suggested 25 interviews was an optimal average number (Boeije 2002; Dye 2000; Leech 2011). Thus, the online survey remained open to the public until the balance between emerging saturation and the average number reported in the literature became evident.

Participants were selected for interviews based on the following criteria:

- completed questionnaire
- availability to conduct interview
- adult people, due to the potential risk involved.

An identified risk was that participants could experience psychological discomfort by feeling self-conscious about themselves (becoming aware of some of their most ingrained perceptions) and about being interviewed (questioned, observed and audio recorded), according to the National Statement on Ethical Conduct in Human Research 2014.

- **Risk management**

While a semi-structured interview allows intensive exploration aimed at reaching depth (Stokes 2006), such an intimate experience should be conducted in a safe, comfortable and confidential space so that participants can open up (Kaplowitz 2000,

[4] Initially, audio files were automatically transcribed by a recommended third party. However, an ethical issue arose when it became apparent that the service provider's terms of use did not comply with national ethical guidelines. The Graduate Research School was notified. Remaining audio files were transcribed by the author.

2001). In this context, considering the imperative to protect participants from any possible psychological harm, the following strategies to minimise and manage risk were implemented:

- the provision of an information sheet and a consent form, fully explaining to the participants the extent of their involvement, and reassuring them of the respect and gratitude their contribution elicited
- ensuring a safe environment by giving them a friendly welcome and building rapport, including by showing explicit empathy and using appropriate body language, eye contact and breathing rhythms. These techniques could help the participants to minimise their shyness or nervousness about being interviewed (questioned, observed and audio recorded).
- having a guided interview with open-ended questions, allowing the participants to share their thoughts and emotions as much as they felt comfortable with. If the participant showed signs of distress, the interview would immediately stop, or a break would be offered, with the option to continue on a different day. The participant was reminded they could cancel their participation at any time without any consequence.
- concluding each interview in a positive way, mentioning the importance of constantly exploring, observing and learning from ourselves, reassuring participants that their information would be de-identified, and offering to send them a copy of the final report from the research.

Advice was sought from professional counsellors about rapport techniques, and the best ways to frame the questions and to explore the thoughts and emotions of the participants in a totally respectful, professional and safe environment. Such advice was provided by Megan Bray, counsellor from the Sydney Women's Counselling Centre, and Nikki Thompson, coach at InnerCircleWork Coaching and Consulting. In this regard, authorisation by the Human Research Ethics Committee of University of Technology Sydney was given (HREC 2014000739).

- **Four interview components**

Each interview lasted between 55 and 65 minutes and comprised four components. The first component was the self-recognition of the participant's personal worldview as a whole entity. Four worldview options were identified by a specific label (Traditional, Modern, Postmodern or Integrative), where each type of worldview corresponded to a characteristic set of perceptions from five meaning systems (ontological, epistemological, axiological, anthropological and sociological). Participants were given visual and verbal descriptions of each of the four worldview classifications, and asked to self-nominate the worldview that best represented them. The worldview suggested by the online survey was then revealed to the interviewee. Participant responses to similarities and differences between the self-nominated and survey-assessed types of worldview were closely observed and recorded.

In the second and longest component of the interview, participants were asked to explain why they chose particular perceptions as the most representative of themselves, and they were asked to rephrase the perception they chose in their own words. Participants were then asked to share examples from everyday behaviours that embody those perceptions. This part of the interview was based on those questions where the mismatch between the self-nominated and the survey-assessed types of worldviews occurred, aiming to accentuate the self-recognition of confronting meanings.

The third component of the interview required the participants to identify the most significant life experiences they would recognise as the crucial influences shaping their worldview today.

The fourth interview component involved a final reflection of the overall experience of self-recognition of personal worldviews (answering the online survey and attending to the interview).

c) Third round of interaction: three online follow-up questions

Two to three months after the interviews were conducted, three follow-up questions were asked to each interviewee, with the purpose of identifying the nature of self-reflection that may have emerged after participating in this study. These were:

- *After having our one-hour interview, have you been reflecting on what we shared during that conversation?*
- *If the answer is yes, please describe such reflection. (On what? When did it happen? How did it happen?)*
- *As a result of such reflection, has any idea, feeling, perspective, opinion or action changed?*

Out of the total of 25 participants interviewed, 13 people responded to the follow-up questions.

The methods for interpretation and the main analytical frameworks employed to draw out the richness of the data are discussed in the following section.

4.3.3 Methods of data analysis: open and axial coding.

The basic NVivo coding involved an open coding process to identify the core concepts and categories that would later form the basic units of analysis (Leech 2011). This process is represented in Figure 9, displaying some of the initial nodes created and patterns identified in the basic open coding round.

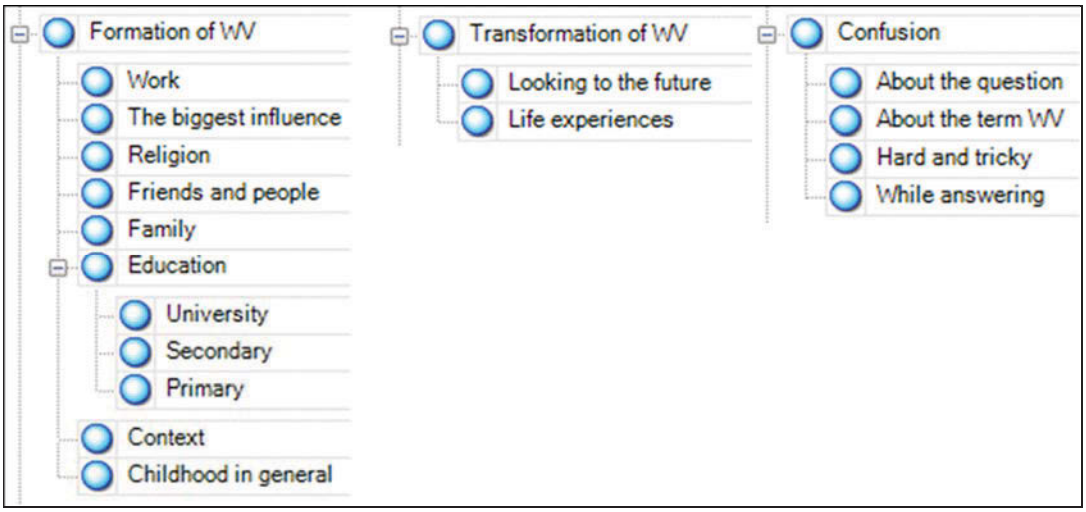

Figure 9. Example of basic NVivo open coding nodes

In addition to the use of the NVivo software, each node was written into a tangible post-it note; all post-it notes were put together onto a piece of cardboard, representing a visual bigger picture, as shown in Figure 10. This physical complementary exercise allowed the simultaneous manipulation of all the post-it notes (nodes), and for them to be visible at all times, against the limited vision on the computer screen.

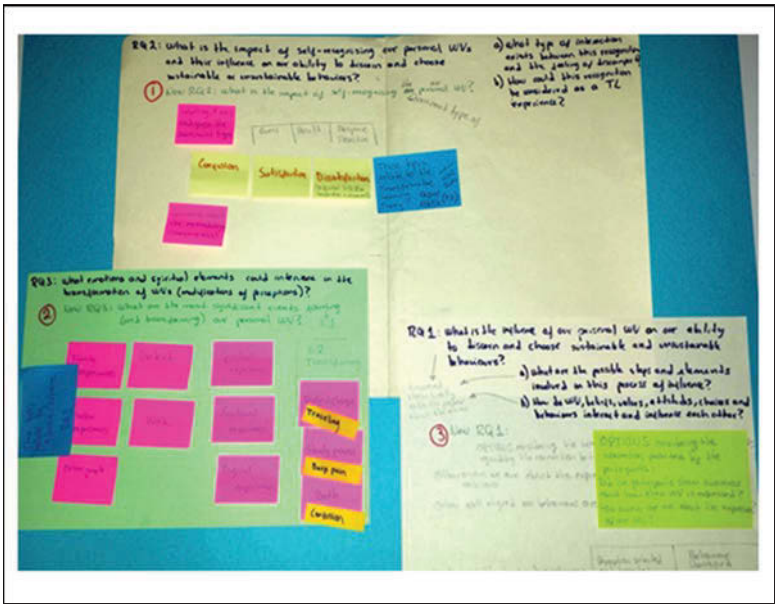

Figure 10. Manual representation of the dynamism of basic coding nodes.

Once in NVivo, the 87 pieces of text were subjected to further coding. The total numbers were: 24 comments on the open-ended question in the online survey, 25 interview transcripts, 25 sets of observation notes and 13 sets of answers to the follow-up questions (see all transcripts in Appendix E). In NVivo, two subsequent rounds of analysis were performed involving axial coding, to identify the relationships and patterns among the concepts and categories already identified, and their possible interpretation (Boeije 2002; Cheney 2010; Higginbottom 2014). Individual comparison (within the same transcript or between two transcripts), group comparison (within the entire group), and comparison among groups (considering certain groups of nodes) were also performed (Boeije 2002; Dye 2000; Leech 2011).

Core concepts (topics) participants discussed were identified first; for example, the nodes *parents' opinions* and *experience with brother* were compared and placed under the node *family context*. Then, *school friends* and *interaction with teacher* were fused under the node *school social environment*. Both *family context* and *school social environment* were placed together in the node called *childhood influences*.

4.4 Summary of chapter

The transdisciplinary integration of overlapping premises found in the literature made evident the underlying ontological and epistemological stances guiding this doctoral journey:

- reality is a continuum of subjective experiences
- reality is perceived through different levels of consciousness
- realities are mentally mirrored, constructed individually, in the collective context.

These stances not only shaped the entire research but, more specifically, defined the empirical design tailored to address the complex enquiry space captured in the research questions mentioned above.

A qualitative strategy was designed based on a CGT approach. An online survey, one-hour individual and semi-structured interviews, and three follow-up questions were the means to collect data. Based on theoretical sampling, constant comparison, open and axial coding, as well as the support from theoretical terms, data analysis was performed.

The exploration of personal worldviews and behaviours is a highly complex process, and there is not a unique or standardised mechanism to do so. This chapter suggested a qualitative strategy; corresponding results are discussed in the following two chapters.

CHAPTER FIVE: What happens when people are asked to self-recognise their personal worldview?

'Knowledge is knowing that a tomato is a fruit; wisdom is not putting it in a fruit salad'

Miles B. Kington

This chapter focuses on the responses of the 25 participants to being prompted to self-recognise and reflect upon their own personal worldview, and its expression through their everyday behaviours.

As explained in section *4.3.2 Methods of data collection: survey, interviews and observation*, the interviews began with the participant being asked to reflect upon the type of worldview they self-nominated, and their survey-assessed worldview. After this introductory exercise, the interviews covered a more detailed process of self-reflection in which the participants shared thoughts and emotions about different aspects and components of their own worldview.

Following a Constructivist Grounded Theory (CGT) approach, new literature was reviewed after data was analysed (McCallin 2003). This task suggested that asking people to self-recognise their personal worldviews could resemble the first five phases of a transformative learning experience:

1) a disorienting dilemma
2) a moment of self-examination with feelings of guilt or shame
3) a critical assessment of epistemic, sociocultural or psychic assumptions
4) recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change
5) exploration of options for new roles, relationships and actions.

Thus, Mezirow's work (Mezirow 1981, 2003; Mezirow 1990), introduced in section *2.1 Two disjointed educational paradigms: educare and educere*, was used as the main interpretive guide (Ramalho 2015). A synthesis of all the arguments and claims given at the end of the chapter answers the third research question:

> **What happens when people are asked to self-recognise their personal worldview?**

5.1 Experiencing the initial self-recognition of a personal worldview as a whole entity

To explore whether self-recognising a personal worldview could potentially become a transformative learning experience, the first task was to investigate the emotional dimension of such self-recognition.

A transformative learning experience usually commences with a disorienting dilemma (Mezirow 1997), which appears to be an inherently emotional experience (Baumgartner 2001; Imel 1998; Malkki 2012; Taylor 1996, 2001, 2007; Wright 2012), followed by self-examination with feelings of guilt and shame (Mezirow 1997). Indeed, some authors have argued that a disorienting dilemma is inherently triggered by confronting emotions (Baumgartner 2001; Imel 1998; Malkki 2012, p. 17; Taylor 1996, 2001, 2007; Wright 2012). In alignment with these premises, this empirical study started with the exploration of the potential of self-recognising personal worldviews, as a probable trigger of a disorienting dilemma or any other kind of emotional response. While there was no attempt to cause disorientation or discomfort, as explained below in some instances, the articulation and comparison of their self-nominated worldview and their survey-assessed worldview did cause some mild and noticeable emotional reactions.

Two main emotions were identified and selected as optimal references to develop the corresponding analysis, indicating potential resemblance with phases 1 and 2 of a transformative learning experience. The participants' responses revolved around a) the

certainty/uncertainty of knowing, thus self-nominating, their own personal worldview and b) the satisfaction/dissatisfaction resulting from the comparison between the self-named and the survey-assessed types of worldviews.

Certainty (or confidence), with the counter valence uncertainty (or doubt), refers to how well something is known. It is the expression of the degree of confidence expressed by an individual where there is no place for doubt. And it is usually considered the highest degree of precision (Bauman 1991). In the context of this research, it alludes to how well people think they know their own personal worldview.

Satisfaction/dissatisfaction regarding the fulfilment of needs and desires, and the achievement of expectations, also refers to being pleased (Perez 2016) or being content and comfortable. In the context of this study, this emotion implies being pleased about oneself (Ortony 1994, p. 121) and about one's knowledge of one's own personal worldview.

The participant's own assessment and declaration of emotion is usually considered the confirmation of the expression of the emotion (Wesson 2009). However, as explained in section *4.3.2 Methods of data collection: survey, interviews and observation*, observations of the participants' responses by the researcher also helped confirm the nature of the emotion. In other words, it is also possible to include the researcher's interpretation (Moore 1990).

In this study, throughout the interview participants were constantly encouraged to directly describe their emotions. They were asked questions such as 'How do you feel?' and 'What are your feelings about it?' Additionally, observation of facial expressions and body language (Russell 2008; Russell 1994; Van Den Stock 2007), captured in fieldwork notes, also constitutes a significant source of confirmation of emotions expressed.

5.1.1 Certainty/uncertainty and satisfaction/dissatisfaction

In this section, the immediate responses to this initial exercise of comparison between the survey-assessed and self-nominated types of worldview are discussed. Primordially based on the expression of certainty/uncertainty and satisfaction/dissatisfaction, this section argues the potential resemblance of this exercise to the first (disorienting dilemma) and second (self-examination with feelings of guilt and shame) recognisable phases of a transformative learning experience.

In half of the group there was alignment between the self-nominated and the survey-assessed types of worldview, whereas the other half self-nominated a different worldview from the assessed one. Some participants expressed and showed certainty in the self-nomination of their own personal worldview which accorded with the survey responses; this situation produced visible and reported satisfaction. Other participants also expressed and showed certainty in nominating their personal type of worldview prior to receiving the results of the survey, but the survey resulted in a different type. In this case, some participants accepted the questionnaire results with a degree of satisfaction, whereas others visibly struggled with the disjunction.

Among those participants expressing some doubt and uncertainty when they were asked to choose one of the four worldview options, the same situation described above occurred. Some participants obtained correspondence, despite the uncertainty, and some others did not. In both cases, some participants accepted the results with a degree of satisfaction, whereas some others visibly struggled with the disjunction.

Figure 11 displays all the scenarios described in the previous two paragraphs, where six combinations between both emotions (certainty and satisfaction) occurred. In the following paragraphs, the role and implications of these two emotions in the process of self-recognising a personal worldview as a whole entity, as well as their possible

resemblance to phases 1 (disorienting dilemma) and 2 (self-examination with feelings of guilt and shame) of a transformative learning experience, are discussed.

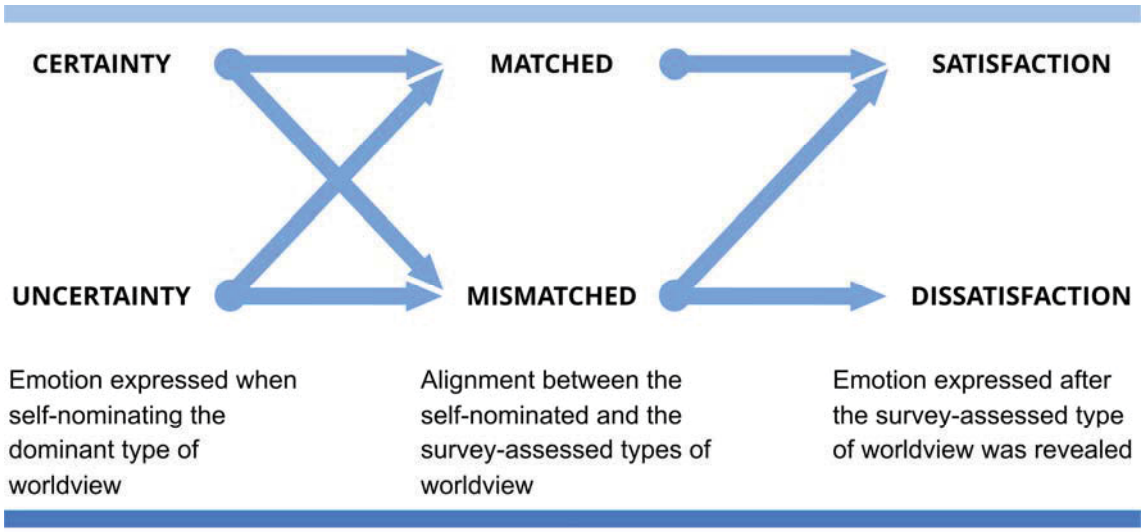

Figure 11. Representation of the six resulting scenarios in response to comparing self-nominated and survey-assessed worldviews.

a) The group of participants expressing satisfaction

At the beginning of each interview, and after listening to the description of the four possible dominant types of worldviews considered in this doctoral research (Hedlund-de Witt 2014b, 2014a, 2016), the participants named the one which they most identified with; then the corresponding result of the previously survey-assessed type of worldview was revealed. Of the 25 people, 17 expressed satisfaction with the results of this initial exercise of self-recognition of their own personal worldview as a whole entity.

The participants who verbally and visually expressed some degree of **certainty** or confidence when self-nominating their personal worldview and whose survey-assessed type **matched**, also showed visual and verbal expressions of **satisfaction** in terms of confirmation and reassurance about who they think they are. Some of these examples included:

- '*Well I know what I stand for*' (7J)
- '*Ok, I feel good, I think it makes sense*' (26J)
- '*It's fine for me, I feel comfortable'* (36A)
- '*Yes, it makes sense; it is in line with my explanation before'* (39P)
- '*So, except for this point, yes, the rest is the Modern type I like. It's what I expected, yes'* (42H)

Two also provided some self-reflection about the match:

- '*…and taking myself out of that place into other places, into another region, made me question my set of beliefs… so I think I feel very comfortable being part of the Integrative quadrant or group…'* (1E)
- '*Yes, definitely. It does make sense. I am quite a spiritual person. I grew up in a worldview that goes beyond the material and the material world. So, yeah definitely and that's my upbringing and I brought that with me into adulthood, into the present*' (4Ch)

With regard to this group of people, it is possible to argue that satisfaction arose from, or is related to, the confirmation and reassurance regarding their identity and personal narrative about what they know about themselves, or how they see themselves.

According to the Transdisciplinary Framework of Worldviews and Behaviours (TFWB), a worldview compiles meaning structures that the person elaborates to make sense of her/himself and her/his reality; in this context, feeling content about the personal worldview could be interpreted as feeling good about such structures, about the perceptions the participants have created about themselves and their reality. Within this group of people, self-recognising their own personal worldview could be seen as one of those events '*that support a favourable view of oneself*' which '*tend to create positive feelings such as pride, happiness and satisfaction*' (Davidson 2009, p. 777).

Participants might have experienced reassurance about their own identity, reporting positive feelings like satisfaction (Diana 2014; Heine 1999; Ramesh 2013).

Participants who showed **some initial certainty** but experienced a **mismatch** between the self-nominated and survey worldviews displayed eyebrow frowning, looking down, and remaining in silence for a few seconds, which could be inferred as experiencing a moment of self-reflection (Barger 2006; Dimatteo 1980; Koros 2012; Sporer 1995), followed by the expression of a possible explanation. For example, participant 16B said, after a long silence, '*How do I feel?'* and then after a shorter silence:

> *I think it is ok, I feel satisfied, according to what I understood it includes a little bit of the other three views, and I remember a strong emphasis on sharing, and yes, I like to share who I am, what I know, and learn from others… I believe in this aspects; therefore, in the Integrative type of worldview (16B)*

She might not have related to the Integrative type by definition, but when she heard that was the one resulting from her responses to the survey she took a moment to reflect; she then found the probable explanation (inclusion of different views), and felt identified and satisfied.

Another example came from participant 21G, who originally felt she identified with two types of worldviews but because she had to pick only one ended up excluding the survey-assessed one. She said:

> *When you went through it I thought, 'Oh yes, I can see portions of this and I can see portions of that, and certainly…' I thought that I was most likely this [pointing the self-named worldview] … but I'm comfortable with that [the one resulting from the survey]' (21G)*

The same situation was reported by participant 41C, who said:

> *Yes, I can see myself between the two. I just got the impression that Postmodern is a little bit more critical about science and technology… but yeah. (41C)*

These two examples show that some people might have felt resonance with more than one type of worldview but, given the methodology, where they had to choose just one option, chose a different one to which they could still relate.

Despite the mismatching, this group expressed some level of satisfaction, which involved the acceptance of the different survey-assessed type of worldview – a case aligned with studies affirming that satisfaction is associated with or dependent on acceptance (Earley 1985; Lee 2010; Weber 2002). However, in this group, other relevant elements started to emerge, like critical self-reflection as well as the attempt to make sense of an apparent contradiction about oneself. Whereas reflection involves the assessment of assumptions in general, critical reflection involves challenging the validity of foundational assumptions, like those about the self (Hermann 2002; Mezirow 1990). Critical self-reflection involves the confrontation of previously established and habitual patterns of expectation or certainty (about one's own identity, for example) and the meanings with which people have made sense of the encounters with the internal and external environments (Cheney 2010; Mezirow 1990, p. 4).

As we encounter new meanings that help us account for disturbing anomalies in the way we understand our reality, personal (as well as scientific paradigm) shifts can redirect the way we engage with the world; hence, the most significant learning experiences in adulthood involve critical self-reflection, reassessing the way we have posed problems, and reassessing our own orientation to perceiving, knowing, feeling and acting (Cheney 2010; Keenan 2000; Mezirow 1990). The participants in this group seemed to have critically self-reflected, embraced the challenge, and found a possible

new meaning, or maybe the commencement of an incremental shift in their self-awareness: '*conscious knowledge about oneself*' (Morin 2011, p. 807).
Participants who expressed **some doubt or uncertainty** when initially naming a type of worldview but **matched** the survey-assessed one expressed **satisfaction**; for example, participant 6C said he struggled to choose between the Postmodern and Integrative types, and explained the reasons he felt he identified with both types. When he learned the survey suggested the Postmodern type, he expressed some satisfaction: '*Yeah, okay, of course'*. Participant 27J also expressed she could have both: '*I think those two views, the Postmodern and Integrative, are the ones where I sat there thinking, "I agree with that answer.*"' When she realised that one of those types was the self-nominated and the other the survey-assessed one, she showed acceptance and satisfaction: '*In one sense it makes me feel like I actually knew, yeah, it kind of fulfils what I thought, the kind of way I felt about the two.'* These quotes express satisfaction with the results obtained, even when the participants initially expressed some uncertainty or self-doubt, indicating a potential state of insecurity and concern about their own identity (Hermann 2002; Leary 2007; Leary 2012). Feelings of insecurity can evoke a slight confrontation and/or brief reassessment of some of '*the presuppositions on which our [their] beliefs are based*' (Mezirow 1990, p. 6). However, instead of displaying self-protective measures, as could be expected in a more threatening context (Hermann 2002), the results provided some clarification and reassurance or confirmation, from which satisfaction emerged.

The last scenario related to satisfaction includes one participant who expressed **some uncertainty** and **mismatching** between the self-named and survey-assessed types of worldview. Only participant 5N experienced this circumstance. Before revealing the results from the survey, he explained he thought all types of worldviews were equally valid and that it very much depended on where the person was in the '*evolution of things'*. According to his views, the options could be a position of not self-questioning our beliefs, or a position of self-questioning and reassessing beliefs that might be no longer meaningful, or a position where we are already deconstructing old perceptions

to build some new and different meanings. Despite self-nominating the Postmodern type (which corresponds to his explanation of self-questioning and reassessing beliefs that might be no longer meaningful), when his results revealed the Integrative type (in his views this means already deconstructing to build something different) he said: '*So I'm already there?! Yeah, oh, I'm glad!'* and then he laughed out loud. This participant, as in the previous group, expressed some initial self-doubt and then satisfaction. However, in this case, the satisfaction might have arisen not only from the confirmation or reassurance but also through the achievement of an expectation or aspiration.

b) The group of participants expressing dissatisfaction

The remaining eight participants verbally and physically expressed some level of dissatisfaction when the inconsistency between the self-nominated and survey-assessed types of worldviews became evident. Five of them showed initial certainty and three were explicitly uncertain. Both situations are explored as follows.

Participant 8B demonstrated **initial certainty** followed by a **mismatch** and subsequent **dissatisfaction**. He expressed himself with convincing clarity when self-nominating the Integrative type of worldview, without a moment or sign of doubt, and provided several arguments about his inclusive views of the world, especially society and human diversity. Then, when he was told that the survey-assessed resulting type was the Traditional, he questioned the results and explained again his inclusive views:

> *That's very hard to say, I mean… I'm just saying I don't see a problem over if it's Traditional, Modern, you know, we do them all. So that's for me the Integrative I settled with because I don't see the either/or, and all of them have big values. (8B)*

An important aspect to consider in this case is that, in contrast with the equivalent group of participants who expressed initial certainty and mismatch but with

subsequent satisfaction, where remaining in silence for a few seconds plus the visible signs observed pointed towards a probable moment of self-reflection, participant 8B responded immediately after the survey result was revealed. The lack of verbal and physical indications of probable self-reflection was accompanied by the observation of eyebrow frowning, looking down, and also some body tension and a quick movement of his hands (Barger 2006; Dimatteo 1980; Koros 2012; Sporer 1995). The most revealing indicator of dissatisfaction was a subtle defensive tone perceivable in his voice when he added, '*I found a lot of the questions were forcing me into shapes I didn't want to go. I'm sure everyone says the same [referring to the participants in this study]'*; this could be interpreted as a sign of uncertainty about oneself; perhaps a sense of failure, prompting '*defensive, protective behaviour*' (Hermann 2002, p. 395); or the lack of identification with the four given options.

Another example of the situation described above was provided by participant 12J, who did not seem surprised at the lack of alignment between the two types of worldviews; on the contrary, she said, '*Yeah, that would've been my second, it would've been that, yeah,'* which coincided with acceptance and satisfaction. However, in her case, there was a subtle defensive tone in her voice, and she showed a facial gesture of contempt, where her head was slightly inclined backwards with her chin in a higher position (Ekman 1988; Matsumoto 1992). She said, '*…because I remember when I was taking it [the survey], there was a pattern in the answers so, yeah.'* Another participant with a subtle display of defensiveness and contempt (dissatisfaction) was participant 14I, who did recognise the surprise feeling about the lack of alignment between both types of worldviews but also softly dismissed the accuracy of the results, '*Ok, I'm surprised a little bit. I'm not sure what aspects of that would be descriptive of my opinions, but yeah.'*

In the same group – showing initial confidence, mismatch and dissatisfaction – was participant 29N. This participant clearly expressed surprise and discomfort when the

survey-assessed type of worldview was revealed, by saying, '*I don't know… I think, I guess.'* She paused and remained in silence for a moment, then continued:

> *[I feel] a little bit of discomfort. I guess I would have liked to see myself as more of an Integrated because I do try to, like, embrace different cultures around… maybe also a little bit more of a Traditional only because I do think that some of the older values should be more prominent in society today, but yeah, like I'm a little bit surprised, to be honest (29N)*

The pause she made after expressing some reservations about the results could be considered as a probable moment of self-reflection in which she identified her feelings and expressed disappointment, a cause of dissatisfaction (Alegre 2010; Thomas 1967).

Participant 43H, who was also quite confident while self-nominating his personal type of worldview, transitioned from displaying an initial facial expression of surprise, to a quite long silence while looking down, to, finally, a subtle expression involving intonations and visual clues of irony (Attardo 2003; Devillers 2010; Hancock 2004). Pointing out what he considered to be the two possible causes of the mismatch, he said:

> *I'm a little bit surprised, maybe, I don't know, because of what I said… so yes, I'm surprised but it could be… so I'll think about it, maybe it's me, that I don't have a good view of myself, or maybe there's something in the questionnaire [laughed out loud], it's up to you to solve this [laughs] (43H)*

Like participant 29N, this could be another example of the manifestation of uncertainty about oneself but, again, instead of prompting a '*defensive, protective behaviour*' (Hermann 2002, p. 395), it was more of a self-reflection experience. And, although he smiled and laughed at the end, it was not a display of the satisfaction-type of content, but more of an ironic type of content (Attardo 2003; Hancock 2004); irony, like metaphors or idioms, is an example of the nonliteral use of language (Davidson 2009, p. 542).

The remaining three participants who expressed **some doubt and uncertainty** about self-nominating a specific type of worldview and then, when the survey-assessed type was revealed, expressed **dissatisfaction** about the **mismatch**, were participants 24R, 25S and 40J. While their main arguments were based on methodological vulnerability, a subtle expression of discomfort was perceivable; a neutral face showing some indifference or disregard was identified (Kret 2013; Russell 1997). These expressions could correspond to the discomfort caused by being exposed or questioned, as discussed in the risk management part of section *4.3.2 Methods of data collection: survey, interviews and observation*. This group of participants clearly represent the complexity of the enquiry space, and the difficulty to make accurate interpretations.

In particular, participant 24R expressed:

> *I think that, always with questions when you have to choose one or the other there, I always find this multiple choice, you're locking in and locking out some responses, where I'd be more inclined to give an open-ended response and say it depends on context so that's where I was finding myself thinking it's really neither, but if I had to choose is this and this so, yeah… and that took, actually I had to have a couple of goes at completing the survey because I started off thinking I had to answer all of the questions in the set, and then I realized, 'Oh no, go back to… read the instructions again', yeah (24R)*

A similar argument was provided by participant 40J, who also referred to the difficulty of choosing just one option: '*all the questions were, you just have to choose one and that was the difficult part, I guess'*.

Participant 25S was the most critical of all. First, she said:

> *I think they are pretty restrictive, actually. And I think they take out some of the fundamental basis of what I believe in… I think I wasn't happy with any of them because they ruled out something that was fundamental in my belief. (25S)*

Similar to participant 8B, this participant might also have felt forced into particular shapes not representative of what she considered to be her worldview. Later she questioned whether the survey had a quantitative or a qualitative purpose, clarifying that she would not have participated if it was the former: '*…the reason why I asked you who developed this tool… if it's going to be used as a tool rather than as a thought process… and the answer was no way'.* Instead of describing her thoughts and emotions on the comparison of both types of worldviews, as the other participants did, she spent the initial part of the interview asking questions about the academic background of the survey, concluding that she thought it was limiting, and adding:

> *I'm not criticizing what you are doing I'm just looking at pieces of the tool… Yeah, just looking at my answers and looking at that kind of scenarios or situations and beliefs, for me that is almost same thing as a black and white, which is not, life is a bit more complex (8B)*

While Chapter 4 acknowledged the methodological vulnerability, the limitations expressed by these three participants point to areas of further research discussed in Chapter 8. As mentioned above, a possible interpretation pertinent in this group could be that the response of these three participants arose from the negative feelings like shame and frustration that can arise from events that contradict one's perceptions or worldview (Davidson 2009). Negative feelings could be accentuated when there is not enough confidence about those perceptions:

> *Taking action on a new transformative insight can be blocked by external or internal constraints (or both), by situational and psychic factors, or simply by inadequate information or lack of skill to proceed. (Mezirow 1990, p. 4)*

The responses in this second group better resemble phases 1 (disorienting dilemma) or 2 (self-examination with feelings of guilt and shame) of a transformative learning experience. Subtle expressions of defensiveness, contempt, surprise, irony and disregard support the overall dissatisfaction experienced by these participants – also, critical self-reflection. Mezirow's theory focuses on the importance of what have been

named *negative* emotions as triggers of critical reflection (Baumgartner 2001, p. 17; Malkki 2012). Participants in this study might have not experienced a disorienting dilemma at the level of a personal crisis as originally reported by Mezirow (Mezirow 1975a, 1975b); rather, they experience a few moments of discomfort. However, they seemed to have, at least on a basic or initial level, engaged in critical self-reflection and the re-evaluation of their foundational perceptions. A disorienting dilemma implies the experience of emotions that prompt the realisation that something is not consistent with what people hold to be true (Baumgartner 2001; Kitchenham 2008). The relevance of sensing these particular emotions and a disorienting dilemma is the inherent opportunity to critically self-reflect on own meaning structures. This could lead to the reassessment of '*habitual, implicit rules for interpreting experience*', resulting in potential changes in perceptions or, at deeper level, the transformation of a worldview (Mezirow 2000; Sharma 2007).

In sum, this group showed signs of critical self-reflection and the probable confrontation and readjustment of some of their foundational assumptions (Mezirow 1990, p. 6). Thus, the opportunity embedded in this experience to challenge previously established and habitual patterns of expectation or certainty about one's own worldview could be confirmed. Self-recognising a personal worldview can be a challenging task that triggers some critical self-reflection, which, in turn, leads to the conscious recognition of some unconscious perceptions, providing a potential increment in self-awareness: '*conscious knowledge about oneself*' (Morin 2011, p. 807).

5.1.2 Self-recognising personal worldviews prompted emotional appraisals

A worldview is an abstract concept, and self-recognition of a worldview could be challenging. Hedlund-de Witt's tool (Hedlund-de Witt 2014b, 2014a) provided a useful guide in exploring how to address such a task through the combination of the four

labels, with corresponding visual and written descriptions, and a questionnaire to identify the most and least dominant type of worldview an individual can have.

As data collection and analysis progressed, it was possible to identify that the participants' responses revolved around certainty/uncertainty and satisfaction/dissatisfaction. However, the study of such responses here can only be regarded as preliminary, in that it represents an initial attempt to empirically explore the self-recognition of a personal worldview, where the lack of literature was an obstacle to overcome.

The responses collected in this study resembled the first and second phases of a transformative learning experience. The crucial component of the first phase, a disorienting dilemma, is critical self-reflection; this occurrence was reported not only by people experiencing dissatisfaction but also by some people expressing satisfaction. Regarding the second phase of a transformative learning experience, specific feelings of guilt and shame were not reported by the participants, nor were they further explored in this project. On the flip side, signs of self-examination and assessment of perceptions (critical self-reflection) were observed by the researcher and reported by the participants.

Based on Maliki's work (Hoggan 2017; Malkki 2012) and Taylor's work (Taylor 1996, 2001), this research acknowledges that emotions provide both the impetus for critically self-reflection and the basis on which to reflect (Kostoulas-Makrakis 2010). Section *2.2.1 The processes of the mind: intelligence, learning and memory* – particularly the third premise of embodied cognition recognising that emotions constitute '*the fundamental aspect of mental life*' (Siegel 2001, p. 90) – as well as the TFWB highlighted the fundamental role of emotions on the mind. Attendant emotions prompting the need to critically self-reflect and assess perceptions can eventually translate into increasing self-awareness of who and how we are, allowing

corresponding reformulations in meaning structures, to permit a more inclusive, discriminating, permeable and integrative way of being (Taylor 2001, 2007).

Self-recognising a personal worldview as a whole entity has been proven to be one of those experiences that prompted critical self-reflection. According to the participants' narratives, self-recognising a personal worldview can provide an opportunity to experience the potential identification, adjustment, change or transformation of some foundational meaning structures. Self-recognising a personal worldview involved some level of assessment of how participants see themselves, which has the potential to be a transformative learning experience of foundational perceptions and meaning systems.

5.2 Experiencing a more detailed self-recognition of a personal worldview, its components and expression

After the initial exercise of self-recognition of a personal worldview as a whole entity, the interviews covered a more detailed process of self-reflection. In their own words, participants explained and rephrased some of their answers to the survey and the multiple-choice questions. They were asked to explain their own understanding of the question, and why their selection of one of the four multiple-choice answers was the most representative of their worldview. They were also asked to provide examples of behaviours that could demonstrate this aspect of their worldview being expressed in their daily life. Participants were exposed to those few questions where the match between the self-nominated and the survey-assessed types of worldview did not occur. The aim was to evoke a deeper level of reassessment by stimulating critical self-reflection through creating a situation in which participants attempted to make sense of an apparent contradiction about them. This, according to Herman (Hermann 2002) and Mezirow (Mezirow 1990), involves challenging the validity of foundational perceptions.

This more detailed process of self-reflection experienced by the participants resembled phases 3 (critical assessment of epistemic, sociocultural or psychic assumptions), 4 (recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change) and 5 (exploration of options for new roles, relationships and actions) of a transformative learning experience (Mezirow 1981; Mezirow 1990).

Findings show that the self-recognition of perceptions and behaviours was an irregular process among participants and within the same person. It was possible to observe inconsistency throughout the interview with variations in their capacity to express themselves and to represent their perceptions and/or behaviours. Some participants provided clear explanations of their views, and examples of behaviours that were well aligned with such views. Other participants struggled to rephrase the questions, or to explain why they selected a specific answer, or to describe a representative example of behaviour, regardless of the type of perception being discussed. Sometimes this lack of consistency was expressed by the same participant as the interview progressed; in other situations, the same person could provide clear explanations and later struggle to explain her/himself, and vice versa, throughout the entire interview.

5.2.1 Critical self-reflection about perceptions and behaviours

The third research question, and the title of this chapter (*What happens when people are asked to self-recognise their personal worldview?*), refers to self-recognition, a mental capacity encompassing self-reflection and insight. *Self-reflection* alludes to the inspection and evaluation of one's own thoughts (ideas), emotions (feelings) and behaviours (actions); *insight* refers to the clarity of understanding such thoughts, emotions and behaviours (Silvia 2011). Both mental capacities are crucial components of self-recognition, where they can lead to a potential increment in the capacity to reason on the meanings built by the subjective experience (Morin 2011; Schooler 2015). In this section, both terms are used as a conceptual vocabulary to represent the

empirical findings and its analysis. These two terms are integrated within Mezirow's definition of critical self-reflection (Mezirow 1981; Mezirow 1990).

The following section is divided into separate sections for each of the distinct scenarios that occurred during the interviews: a) participants providing descriptions of perceptions and behaviours in clear alignment, b) participants providing descriptions of perceptions but struggling to express corresponding behaviours and c) participants struggling to provide descriptions of both perceptions and behaviours. Rich and revealing quotes from participants are followed by a short interpretation. After the three scenarios are displayed, the analysis and synthesis of results are presented.

a) Participants providing descriptions of perceptions and behaviours in alignment

After being read the survey question, and being reminded of which of four statements they chose as the most representative of their worldview, participants were asked to rephrase the statement (perception) according to their own understanding of it. They were also asked to provide an example of how they could express such a perception in their daily life, through their behaviours. The following are examples of alignment among the comments made by some of the participants.

Participant 40J (sociological perception):	
The original statement (perception) is:	In society, we should place more emphasis on inner growth and self-actualization
In participant's own words:	*'I guess I was just thinking about it [inner growth] just as personal development, or trying to better yourself by noticing patterns of behaviour that you might want to change or fix.'*
An example of behaviour:	*'One of the biggest things I've done recently is to stop drinking, that's one of the best things I've done. And then even just coming here, you know, my natural instinct would be to shy away from these things but I thought, you know, just do it, you got time so, and yeah, go and see what happens. I don't want to be stuck as the same person doing the same things the whole time.'*

Participant 40J provided a clear understanding about the sociological perception he identified as the most representative of his worldview; he then provided two examples of behaviours aligned with such a perception. He explained he had had some difficulties with alcohol and that he had chosen to stop that behaviour, which he found problematic in his daily life, as a way of bettering himself. Before reaching this moment in the interview, he had already mentioned, '*I'm certainly not an extrovert,*' and, '*I just don't express externally so much.*' So it made sense when, at this moment of the interview, he described participating in this research study as another example of his perception being expressed, by pushing himself forward from his natural tendency to not socialise much.

Participant 36A (epistemological perception):	
The original statement (perception) is:	When I'm forming an opinion on an issue, I tend to trust scientists and other experts
In participant's own words:	*'…we have to wait until something is proved to be true, then I will believe it for sure, rather than believe in someone who hasn't actually proved it, because that could be wrong.'*
An example of behaviour:	*'Vaccination and those links to autism, you know, a lot of parents are scared of that, but scientists say that the risks are so low, and the benefits are so high, I believe in what scientists say so if I would have children I would vaccinate them.'* *'I guess when I go to work and stuff, because I work in dental therapy, so basically if I am not sure about something, about like how a chemical reacts, I have to check it online, the research papers, rather than just asking someone's opinion. I need the back up to make sure it's right.'*

This participant was eloquent describing his epistemological perception on scientific knowledge, and how it has been expressed in his daily life and could be expressed in the future in a particular circumstance.

Participant 42H (axiological perception):	
The original statement (perception) is:	It is very important to me to be imaginative and express myself in the way I think and live.
In participant's own words:	*'…it is also good to have a reason in life, a motif… this is a really important thing. If you find yourself a reason to live, this really helps you a lot… this is my reason, this is what I'm meant to do. And the fact that you believe in that reason then you imagine… and it helps you to make good decisions and do a little bit more, always a little bit more. People who don't have this skill, because not everybody has it, requires a lot of faith and power; if you don't have a strong belief it wouldn't work.'*
An example of behaviour:	*'At the moment I'm studying and becoming an electrical engineer. Back in Iran people wouldn't go to university… it is high school and then a small business or any occupation, and it wasn't available either, it was really hard to do these things. And I didn't want that, I wanted to be a scientist, an engineer. This would be a good thing. In Iran it is only 5% who goes to university. So, for me, learning English and attending to the university, this is a very good thing to do. Have the courage to leave your country, and learn new things, and be good.'*

Participant 42H provided a clear and well-aligned explanation and behavioural example of his axiological perception; he valued expressing himself, finding his purpose in life and overcoming adversities to fulfil such a purpose.

Participant 29N (ontological perception):	
The original statement (perception) is:	Nature is fragile, so humans can easily destroy its delicate balance.
In participant's own words:	*'I believe nature is one of those things that humans manipulate for themselves to get their own benefit… I think that the environment is a very delicate balance of all the different types of things we need, and I think people manipulate the access of those things, like we can overfish and there will be plenty more, and I think that people really don't have regard for what nature is and I guess for me nature is there to be appreciated and it's not there to be used as something that can make you money…'*
An example of behaviour:	*'…last year I went to Cairns and we decided to go to the Great Barrier Reef and at the moment a lot of the reef is getting eroded because of tourists coming, like myself, tourists coming, visiting, having a look… and we're just going there and giving them money, essentially paying for them to destroy the reef, and just like manipulating something that in my personal view shouldn't be used as a driver for like tourism in that area…'*

Regardless of the environmental side or sustainability aspect of her ontological views on nature, participant 29N expressed coherence among three issues. The first relates to perceiving that humans can easily destroy the natural balance. The second is her explanation of how people establish financial transactions for their own benefit at the expense of the natural balance. The third element in the alignment of her comment is that she paid to be taken as part of a group she recognised as being responsible for the erosion of the ecosystem. Despite her objection to the financial transaction involved in some tourist activities that involve a detrimental manipulation of nature, she admitted to being part of it. In the strict sense of this exercise she shows alignment among the three components; however, taking into account her ontological views, her answers could be interpreted as either she misunderstood the question, or that she might have just realised about this alignment in a contradicting way, exactly at this point in the conversation. This is based on the obvious discomfort she expressed.

Participant 39P (ontological perception):	
The original statement (perception) is:	Nature is fragile, so humans can easily destroy its delicate balance.
In participant's own words:	*'It means that our planet is, or used to be, a system with a balance, you know, the cycle of water and whatever. But if you look at humans and the way we utilize the world… we can't just do whatever we want and it will be fine, nature is dying.'*
An example of behaviour:	*'Two things, one is that, as a general approach, I try to minimize my impact on nature, like I try not to produce waste for example. And the second one is about the orders of magnitude, if nature is fragile, then the universe is fragile and also myself… I think about things that are good for the environment and for myself, as part of the environment. So, I've been questioning what I'm doing, what is the impact of what I choose, on me and the environment too. I respect my body, and the community and the world…'*

Participant 39P expressed his ontological views on nature in terms of the concern he feels about the damage of human activities. He expressed a behaviour that aligns with exploring how to minimise such impact. Also, he eloquently explained what the balance means for him, in terms of relatedness or interconnection among orders of magnitude.

Participant 9T (anthropological perception):	
The original statement (perception) is:	Human beings think mostly of themselves.
In participant's own words:	*'I think it probably reflects my slightly pessimistic side. Yes, there's a side to humans, it's not the exclusive side, I know there are positive aspects of humanity but there's a strong selfish component and I think that's probably what I was attracted to by that answer…'*
An example of behaviour:	*'So in my daily life… mmm… this one is a hard one… mmm… it's one that I can't often express because it's probably not politically correct but I'm going to give it to you anyway. I think a lot of people are selfish on how they think about having children, and one of the reasons comes back to sustainability for me. I know that the world population, the growth rate is declining but it's still growing… and so bringing that back to my personal life is not the exclusive, the only reason, but is one of the reasons why my wife and I we've chosen not to have children so that's one of the main reasons.'*

Participant 9T is clear about the reason he picked such a statement to represent one of his anthropological perceptions; he also rephrased it in a clear and coherent form, alluding to what he considers the selfish side of the human condition. His example of behaviour directly counteracts the negative perception he owned and described before. It is an interesting example where the alignment is clear, though in an opposite meaning; while he perceives a negative aspect of humanity as a whole, he tries to be different as an individual. He acts differently from what he perceives as a dominant and negative aspect of modern society.

In this section is possible to observe examples of moments where participants exhibited clarity and alignment while describing perceptions and behaviours. They critically self-reflected on their own worldview (Mezirow 1981; Mezirow 1990), showing self-reflection (evaluation) and insight (understanding).

b) *Participants providing descriptions of perceptions and expressing difficulty when explaining behaviours*

On other occasions, some participants managed to provide an explanation of their understanding of a specific selected statement (perception) but struggled to provide an example of how such a perception is expressed in their daily life. Examples are presented below.

Participant 36A (ontological perception):	
The original statement (perception) is:	Nature has value in and of itself even if it has no value for humans whatsoever
In participant's own words:	*'It's not only valuable for humans, it could be valuable to other life forms, so even if humans were not on the planet, nature still would be important for everything else to exists, yeah.'*
An example of behaviour:	*'Honestly, I couldn't think of anything right now.'*
Participant 41C (ontological perception):	
The original statement (perception) is:	The universe is governed by mechanical and natural laws
In participant's own words:	*'Yeah, that's like the real scientist side of things… if humans didn't exist nature would be there… it doesn't really depend on us… things function biologically speaking… mechanics like gravity, and friction and things like that…'*
An example of behaviour:	*'That's a hard question, oh God! Oh my God! That's difficult.'*
Participant 39P (ontological perception):	
The original statement (perception) is:	The universe is governed by mechanical and natural laws
In participant's own words:	*'I believe that the universe is governed by something that is not a higher entity or God pulling the strings, it's very much like rules governing the world, and those rules would apply regardless of… yeah.'*
An example of behaviour:	*'That is a hard one… can you give me an example?'*

The three participants above rephrased the statement they chose as the most representative of their ontological perceptions; however, they could not provide an example of their actions in daily life representing such a perception being expressed.

Participant 29N (epistemological perception):	
The original statement (perception) is:	Science and technology are often corrupted by special interests; for example, big corporations
In participant's own words:	*'I was actually learning about corporations and their manipulation of different like studies and different stuff… organizations are mainly driven by wealth, money and doing things like that, I think, get corrupted… I think that there's a big problem'*
An example of behaviour:	*'I would say one example I could give was when I was doing my HSC we had a particular student who was very well known by the teachers, her parents were very involved in the school, so the faculty knew who she was… and so what would happen is that she would be getting questions given to them before the rest of us... and basically they found out that the teachers were getting incentives to make sure that this student was doing well…'*

This participant described an event she observed, but not an example of her own actions representing the epistemological perception she managed to rephrase.

Participant 40J (ontological perception):	
The original statement (perception) is:	Nature is fragile so humans can easily destroy its delicate balance
In participant's own words:	*'I guess nature is this complex system that can be easy to sort of disrupt. I don't have a deep understanding of this stuff at all. From my basic general understanding it has a delicate balance that it's easy to disrupt, I guess.'*
An example of behaviour:	*'I don't know. I don't drive, but because I'm too lazy not necessarily because of nature.'*
The original statement (perception) is:	When I'm forming an opinion on an issue I try to honour all perspectives and combine them into a larger whole.
In participant's own words:	*'I don't really think of myself as a very opinionated person, I never feel like I have enough information to sort of make a decision or have an opinion. I always try to think about different perspectives, other people's positions.'*
An example of behaviour:	*'Not that I can think of… I spend a lot of time alone.'*

This participant could rephrase the statements and provide some of his understanding about his ontological and epistemological perceptions, but he struggled to provide an example of how such perceptions could be expressed though his daily behaviours.

Participant 24R (anthropological perception):	
The original statement (perception) is:	I use the pain and suffering in my life as opportunities for inner growth
In participant's own words:	*'Well, we have to carry on, I mean you can complain about things or you can say ok from this we learn, from the pain we learn, from the difficulties we learn…'*
An example of behaviour:	*'It's too hard to talk about it, so I can't.'*

In this case, the participant provided some of her understanding of the statement she chose. However, she would not provide an example of how such an anthropological perception might be expressed through her actions. This particular quote will be explored in more detail in section *d) Analysis and synthesis of results*.

Participant 7J (axiological perception):	
The original statement (perception) is:	The most important thing in my life is to be of service to my family, community, and/or country
In participant's own words:	*'…if you want to have a fulfilled life, the best way to do that is to offer your time, volunteer, help other people, and that's what will bring you true satisfaction and connection; connection with people, connection with society, community is what we all probably yearn for.'*
An example of behaviour:	*'…so again those values, those sort of things also align with my worldview and values I supposed, just looking up yeah.'*

The participant rephrased his axiological perception in a clear form, referring to human interconnections as the most important in his life; however, when asked to provide an example, he rephrased his perception again, as if he wanted to explain more about his perception, and it was just at the end of the second explanation when he added the sentence presented above. In this sentence he connected his ideas (description of perception) with his views of his own worldview; however, he did not include a clear example of behaviour.

Participant 5N (sociological perception):	
The original statement (perception) is:	In society we should place more emphasis on inner growth and self-actualization
In participant's own words:	*'Yeah. Just that self-worth, self-love. Nothing in a sense of narcissism but loving oneself is very important, treating oneself well. Inner growth is… you feel a better person each day that you were learning… that one is learning that you were progressing basically. Evolving, progressing, evolving, and becoming better. More confident about oneself.'*
An example of behaviour:	*'There have been many moments in my life where I felt lucky about where I was dropped. So lucky that I wasn't dropped in a village where I had to strike for my life… I was pretty lucky to have come across a number of people who have helped me a lot… they all contributed a little bit for me to become who I am now.'*
Participant 5N (sociological perception):	
The original statement (perception) is:	When individuals thrive and blossom, they naturally start working for a better world for all
In participant's own words:	*'Because when people are feeling in a certain way it means their future is open, and if their future is open, then their tendency is to do more useful, better things. When their future is closed it's then when a lot of people start behaving, their behaviour just reflects that, if the future is closed. The worst thing that can happen when people look at their future is that it's so black that they didn't care anymore, so that's what I think.'*
An example of behaviour:	*'People can give to a child… just trying to make them feel that they are precious, they have value, that they can do things, that they can always do things they love. They have options and they can do… whatever they want and then that opens the future. Then we'll become a better person for sure, growing up.'*

It is possible to identify how this participant understands the selected sociological statements; however, when asked about his behaviour, he described other things. In the first case, he referred to having what he considers a privileged life; although it is related to the main topic, it is not an example of his behaviour. The second example represents a common situation for this participant throughout the interview, in which he constantly deflected on other people's behaviours, what other people do or do not do, rather than speaking about himself and his own behaviours.

In this section it is possible to observe examples of moments where participants exhibited some struggle and lack of alignment while describing behaviours that would correspond to their perceptions. They critically self-reflected on their own worldview (Mezirow 1981; Mezirow 1990), showing some lack of clarity in their processes of self-reflection (evaluation) and insight (understanding).

c) Participants struggling to explain their perceptions and examples of behaviours

Another frequent scenario, repeated within one single interview and appearing in other interviews, involved participants struggling to rephrase their perceptions and to provide an example of how such perceptions might be expressed through their daily life behaviours.

Participant 39P (axiological perception):	
The original statement (perception) is:	The most important thing in my life is to actualize my inner potential and thereby serve the cultural evolution of humanity
In participant's own words:	'*That's an interesting choice… ok… that must have been the best fit out of a few… yeah… if I wanted to be successful, I wouldn't be doing science… I just think that you should try, and lead by example… yeah, rambling.'*
An example of behaviour:	*'I don't know… yeah, that's weird, because every day tends to be different depending on... I'll come into the laboratory every morning… What was the, remind me of the question again.'*
After some silence, second attempt:	*'Not particular things, because there's so many, yeah, there's no specific thing… at the moment, the focus is on multiple things… so there's nothing on a day-to-day basis that I can point to and say this is helping me achieve what I wanna do… sometimes I just think to myself, bugger, I'm just gonna disappear and go and ride my bike, be done with that. So there's certainly, there's not one thing that I could say that actually helps, sorry.'*

This participant had a slight moment of struggle accepting his choice of axiological perception, and explaining how he perceived the most important thing in his life.

Additionally, he did not provide a clear example of how he actualises his inner potential.

Participant 6C (sociological perception):	
The original statement (perception) is:	Society should offer decent care for every individual
Instead of explaining with own words, participant showed some doubt and asked instead:	'*What were the other options? What was the least representative?'* *'That's the one I said I least agree with?'*
After a moment of silence, looking down, participant said:	'*Ok, so I chose that one because I feel like we all sort of, we all have our responsibility to look after each other I think…'*
An example of behaviour:	*'I've probably walked past around four or five homeless people and I haven't reached into my pocket… I feel like I just sort of go from home to work to home in this bubble. So it's kind of tricky.'*
Later, participant added:	*'I find it quite challenging and hard because you sort of as you talk, I don't know, but the sort of value–action gap is pretty large.'*

This participant did rephrase his sociological perception and did provide an example of how his perception could be expressed. However, the value in this contribution comes from the initial struggle to recognise why he chose that statement in the first place, and in clearly declaring the recognition of a gap between the perception and what he could do but actually does not do. Another example from this same person is the following ontological perception:

Participant 6C (ontological perception):	
The original statement is:	The universe is governed by mechanical, natural laws
In participant's own words:	*'The reason I chose that statement… I can't remember what the alternatives were as to why I thought that was the best… but I don't really.'*

And then, throughout the interview, he constantly expressed statements like, '*This is tough', 'This is where I would… so what was the one I said that was the best match?', 'What were the others, what was the least?', 'That's the one I said I least agree with?', 'Could you read it again, please?', 'I'm not sure if that answers your question, I went on*

a bit of a tangent'. Participant 6C constantly struggled to make sense of his choices of statements as best representations of his perceptions and, consequently, to provide examples of his behaviours.

Participant 8B (anthropological perception):	
The original statement is:	When it comes to interfering with nature, mankind has no right to play God
In participant's own words:	*'Ok so the point would be… I've forgotten what I was gonna say… yeah, I can't remember what got me going on that one now.'*
Participant 42H (anthropological perception):	
The original statement is:	Human behaviour tends to be rational and functional
In participant's own words:	*'Human behaviour is… I'm not really sure about that.'*
Participant 25S (anthropological perception):	
The original statement is:	I feel to be more a citizen of the world than a citizen of a country
In participant's own words:	*'Oh! That was the best match?! Oh ok [laughs]…I think realistically we can't be part of the whole world, because there are other dynamics that are preventing us from being true to ourselves because... what was the question? I don't really know.'*

The three anthropological perceptions above could not be rephrased properly by the participants. They did try, but they ended their descriptions by losing their train of thought, with noticeable confusion. In their quotes it is possible to identify a struggle to describe how they understand the statements they selected as the best representations of their perceptions. They were able to select the corresponding statements when answering the survey; however, days later during the interview, after listening to them again and being asked to rephrase them, they stumbled when explaining themselves.

Participant 23N (epistemological perception):	
The original statement is:	When I'm forming an opinion on an issue, I try to honour all perspectives and combine them into a larger whole
In participant's own words:	*'Ok, so, I guess that's related to complexity. What was the first part? When I…'*
Participant 26J (epistemological perception):	
The original statement is:	When I'm forming an opinion on an issue, I try to honour all perspectives and combine them into a larger whole
In participant's own words:	*'Mmm [silence] I mean [silence]…it's hard.'*

These two participants struggled to rephrase the same statement they selected as the most representative of their epistemological perceptions. Other examples follow.

Participant 43H (anthropological perception):	
The original statement is:	Human beings think mostly of themselves
In participant's own words:	*'What are the other options? Because I don't really understand that sentence.'*
Participant 4Ch (ontological perception):	
The original statement is:	Reality is complex: it is both scientific and spiritual at the same time
In participant's own words:	*'Well I believe that there is… what was that statement again, sorry?'*
The original statement is:	Nature has value in and of itself, even if it has no value for humans whatsoever
In participant's own words:	*'Ok, so, but maybe… that's kind of a tough one. It's difficult to make that connection. I suppose because it is an idea. Yeah, that's tough. I can't, right now. My mind is a blank on that one. Because I feel that if… I am… I lost my train of thought. Let me repeat that again.'*

Participant 43H struggled to explain the statement he chose as the best representation of one of his anthropological perceptions, and participant 4Ch struggled to rephrase two of her own ontological perceptions.

In this section is possible to observe examples of moments where participants exhibited some struggle and lack of alignment while describing both their perceptions

and behaviours. They critically self-reflected on their own worldview (Mezirow 1981; Mezirow 1990), showing lack of clarity in their processes of self-reflection (evaluation) and insight (understanding).

d) Analysis and synthesis of results

The self-recognition of personal worldviews inherently implies multiple and variable moments of critical self-reflection. The examples from the three scenarios above show that each interview prompted multiple moments of critical self-reflection, where participants attempted to explore and communicate their own understanding about some of the components and expressions of their own personal worldview, with more or less clarity and alignment. The inconsistency observed through the variations in the participants' capacity to critically self-reflect has different possible explanations that will be briefly reviewed in the next section. It is important to notice that self-recognising perceptions and behaviours triggered different moments of critical self-reflection (self-reflection and insight) and this is in itself the main contribution.

- Possible explanations behind the variations in critical self-reflection observed

There are several reasons why people are not '*an open book to themselves*' (Koch 2007; Kochanska 1994; Wilson 2004, p. 494). Each of the three scenarios displayed examples of the five types of perceptions (ontological, epistemological, axiological, anthropological and sociological), eliminating the possibility that the scenarios that were difficult to describe were because some types of perceptions were more difficult to self-recognise and/or express than others. Instead, people do not have full access to their mental processes, because the conscious experience is fluid and intermittent; it rarely remains on one topic for an extended period of time without deviation. Its dynamic nature is illustrated by the experience of mind-wandering, in which attention switches from a current task, like answering a specific question while being interviewed, to unrelated emotions and thoughts (Smallwood 2008; Smallwood 2015).

There are also motivational reasons, where an intention, consciously or unconsciously, is at play – for example, suppression, intentional forgetting, complete forgetting and repression (Wilson 2004). But, most commonly because of non-motivational reasons, the majority of the mental life is inaccessible because of systemic or organic reasons inherent to the evolutionary process of our species (Koch 2007; Wilson 2002b, 2004). All of these are briefly explained as follows.

The variations in critical self-reflection observed in this research could be explained by more than one of the reasons above. For example, after reflecting on pain and suffering, participant 24R's quote *'It's too hard to talk about it, so I can't'* could be interpreted in, at least, three different forms. Maybe she just did not feel comfortable or safe enough to share a sensitive event with a stranger in a formal academic setting. Perhaps she might have faced a moment of *conscious suppression*: a defence mechanism forcing the unwanted information out of her conscious mind, which would arouse anxiety or pain if recalled, preventing her from entering into it, and allowing her to focus on other issues (Schooler 2015; Smallwood 2015; Wilson 2002b, 2004). Probably, she was at the beginning of an *intentional forgetting* process, which is a form of suppression where forgetting is initiated by a conscious goal to erase and suppress an unpleasant memory of a trauma or a loss that is particularly painful (Wilson 2004). Intentional forgetting is the motivated inhibition of encoding or recalling memories, even before their consolidation; however, the material is not completely erased from memory and can be recovered under some circumstances (Schooler 2015; Smallwood 2015; Wilson 2002b, 2004).

Another two explanations of variable critical reflection, which were not evident in this research but might have occurred, are the *complete forgetting* process and *unconscious repression*. The former means that people succeed in removing material from memory completely – the material is erased and is no longer present in memory. The latter represents a defence mechanism in which people subconsciously block unpleasant or intolerable thoughts and feelings, pushing them into their

unconsciousness (Schooler 2015; Smallwood 2015; Wilson 2002b, 2004). Some individuals might use unconscious repression to become unconscious about traumatic past memories; for example, a person having no recollection of the abuse suffered during childhood (Wilson 2002b, 2004).

According to the literature, participants in this research – and people in general – are naturally motivated to keep material out of their consciousness (Hoggan 2017; Schooler 2006; Wilson 1991). However, suppressed or repressed material can potentially influence people without their awareness, and this situation might have happened during the interviews in this study. Depending on the extent to which participants have been motivated to keep material out of consciousness (by blocking out thoughts, emotions or memories), and the extent to which they have succeeded in doing so, is the same as the extent to which their intentional capacity to critically self-reflect, hence to self-recognise their own personal worldview and access to this material, had been affected (Wilson 2004, p. 498).

The *systemic or organic* explanation is due to the evolutionary process of humankind (Schooler 2015; Smallwood 2015; Squire 2015; Wilson 2002b, 2004). The unconscious mind existed before consciousness evolved (Chalmers 1995; Squire 2015), as recognised by embodied cognition and discussed in section *2.2.1 The processes of the mind: intelligence, learning and memory*. This implies that the unconscious contents and processes influence people's thoughts, emotions and behaviours, independently from consciousness (Squire 2015; Wilson 2002b, 2004). Indeed, a great deal of mental content and processing is simply inaccessible to conscious scrutiny; independence between unconscious and conscious processing has been found in many types of psychological functioning (Koch 2007; Schooler 2015; Smallwood 2015; Wilson 2002b, 2004). As discussed through the fourth main premise of embodied cognition, large parts of mental functioning – including foundational processes of intelligence (information-processing), meaning-making (learning), attention and memory (Squire

2015; Wilson 2002b, pp. 1-16) – are inaccessible to consciousness, '*no matter how much people introspect*' (Wilson 2004, p. 508).

The previous two pages briefly explain the multiple possible reasons behind the variations in critical self-reflection observed in this research. However, this analysis is limited in making a direct link between the specific explanations, or reasons, and the information shared by the participants. Nevertheless, the critical insight to consider out of this analysis is that the exercise of self-recognising perceptions and behaviours triggered different moments of critical self-reflection – that is, this research task prompted an increment in critical self-reflection, a mental ability more recognised in the *educere* approach to education than *educare* (Bass 2004).

- The relevance of prompting an increment of critical self-reflection

Participants in this research have shown that self-recognising personal worldviews involves critical self-reflection (self-reflection and insight), a mental skill that requires conscious attention, focused attention on reasoning about the subjective experience (Schooler 2015), focus on the self (Abrams 1989), and focus on the meanings of our experiences (Hill 2001). Despite the causes of variation presented above (mind-wandering, suppression, forgetting, repression) – of which the most common, according to the literature, is the inherent nature of the unavailable unconsciousness – (Hasenkamp 2012; Sanders 2016; Schooler 2004a; Schooler 2015; Smallwood 2015; Wilson 2002b, 2004) the possibility to prompt and increase the volatile, unstable or impermanent mental capacity to critically self-reflect implies benefits (Mezirow 1997, p. 11). The main benefit is the opportunity for the person to increase consciousness and improve the coherence of their personal narrative; this is the foundation of the Transformative Learning Theory (Mezirow 1997). Mezirow's theory advocates for those methods encouraging critical self-reflection and '*experience in discourse*'; the focus is on discovering the meaning systems that shape the way people feel, think and act '*about their sources, nature, and consequences, and on imagining alternative perspectives'* (Mezirow 1997, p. 11).

The findings in section 5.2.1 show that asking people to self-recognise their personal worldviews inherently prompts moments of critical self-reflection. Participants exhibited multiple attempts, sometimes succeeding, of self-reflection where they inspected and evaluated their own thoughts (ideas), emotions (feelings) and behaviours (actions). They also made multiple attempts, again with different levels of completion, at insight, where they referred to their clarity of understanding of such thoughts, emotions and behaviours (Silvia 2011).

This section discussed how the participants responded when they faced conflicting meanings which triggered a more personal process of critical self-reflection, where participants explored further and tried to make sense of some apparent contradictions about the validity and coherence (Hermann 2002; Mezirow 1990) of some of their foundational perceptions and behaviours. The next section will discuss what the participants reported about the experience of participating in the interviews; despite how challenging or confronting their participation might have been, the overall sensation was positive. Critical self-reflection can be confronting, but it helps to build more coherent personal narratives and is worth the effort, as will be argued next.

5.2.2 Critical self-reflection about the overall experience of being asked to self-recognise a personal worldview

This section discusses some of the beneficial aspects of critical self-reflection, in the context of the overall experience of self-recognising personal worldviews (survey, interview and follow-up questions). Despite the challenges, discomfort and difficulty involved in accessing the mind and making sense, self-recognising one's own worldview was reported by all participants to be an enriching experience. This situation could be due to the implicit opportunity of this participatory experience, to explore and improve the coherence (alignment) of their personal narratives (Schooler 2015; Wilson 2002b, 2004). This opportunity likely facilitated the discovery of possible

new meanings or the adjustment (or transformation) of old ones. Some examples are discussed in the following paragraphs.

a) Updating own meanings

Participant 1E referred to the opportunity provided by the survey and the interview to update her views on herself and the world. She explained how she sees her worldview constantly changing over time, and her participation in this project made her check in with herself and discern whether she still feels and thinks as she used to, regarding certain of her perceptions and behaviours. She said:

> *…having to sit down and write down a questionnaire and having to give my definite answer it was more like committing myself and thinking, is this what I really think?... Because obviously my belief system has changed from fifteen years ago, it's always changing… but currently it was a different answer (1E)*

Participant 21G also reflected on the opportunity to update. She said:

> *This was an interesting exercise forcing me to review values I had not actually taken time to quantify until now. It was the most illuminating and a positive experience (21G)*

Participant 26J also shared a reflection about change over time:

> *Reflecting on these topics has put me in a contemplative mood... I think this is a really interesting tool that I didn't expect that it would open up like a whole life journey for me which is interesting… It's been interesting to reflect on my whole life journey (26J)*

b) *Identifying priorities in life*

Other participants reported an increase in self-awareness and the identification of what really matters to them; for example, participant 4Ch said:

> *I felt like maybe there was a bit of a self-revelation… I was especially struck by my views on religion… I find myself being wary of extreme religiosity… this survey made me think of the complexity of life today, and wonder about what truly matters in the greater scheme of things (4Ch)*

This participant described a moment of surprise about her own views on religion; maybe she found some meanings potentially useful in adjusting or rewriting parts of her personal narrative. Participant 5N also reflected that the experience prompted thoughts are what really matters in life:

> *Well, I was feeling good that I expressed a few things… yeah, it just basically, it reminded me, like, the various questions, about what's really important, I think it's very useful to be able to talk about it (5N)*

Participant 5N also described the relevance of reflecting in these foundational topics. In terms of identifying the important aspects of life, participant 16B said:

> *Definitely these questions and topics make me recognize how I perceive the world and the universe, and order it up in priorities (16B)*

c) *Enjoying being challenged (gaining self-awareness)*

In terms of being challenged and experiencing this event as either enjoyable or not so enjoyable, three participants shared their views. Participant 9T said:

> *…and at a personal level it's good, you challenged me, you made me think about myself and how I view the world and I value that personally too (9T)*

This sensation was also shared by participant 12J, who expressed:

Interesting survey! I found it thought-provoking to choose between answers. I think it's really good. It's a good self-reflection tool. Sometimes you just do things without knowing or questioning why you do it, so I think this is a nice way to come back to it, so I really enjoyed it (12J)

Another participant who felt challenged was 27H:

The survey brought out the difference in internalising and externalising various drives and ideas I hold…. I don't know if I enjoyed the process, it's been interesting... I feel like the process could be expanded… all of the aspects that we've discussed, you can write a book about, and the viewpoints I have, you know, they're equally valid points to the others (27H)

Regarding the human capacity to increase self-awareness and improve the coherence of personal narratives by critical self-reflection, participant 29N provided a rich reflection. She commenced identifying the extraordinary task of self-recognising herself:

I've never really had to go this in-depth... just the thought process behind me thinking about the worldview that I have, or the different outlook I have on different things, I guess it's very interesting because I normally wouldn't engage with this (29N)

Later, she commented on not having the type of worldview she like to have, and how some of her actions might not be aligned with her deepest desires:

…and… it's a little bit surprising… looking back at things that I have done or I haven't done and, I guess, maybe they're not so much identified with the worldview that I maybe would like to have for myself, I would have liked to see myself as more of an Integrated (29N)

Finally, she reported gaining self-awareness as a positive outcome in improving her personal narrative:

> *…I think it's something that I might be more conscious of, from now on, knowing different things and knowing people's different outlooks, I'll be more conscious of my actions, maybe a little bit more conscious, yeah… I think it really has given me a different perspective on the way I do things, it's been really positive as a whole (29N)*

Participant 36A also reflected on gaining some self-awareness by self-recognising his worldview:

> *I didn't realize I had also a bit of an Integrative view as well, I knew about the Modern type but not the other one. I guess now I understand a little bit more about how people can view the world. I'll understand myself a little bit more, I guess (36A)*

As with two participants previously mentioned, 14I and 28R, these two participants, 29N and 36A, also compared their perceptions with those of other people; however, the gain in consciousness favouring a more coherent personal narrative is the main focus of attention in their quotes.

The answers provided to the follow-up questions, sent months after the interview concluded, also showed a probable gain of self-awareness as a beneficial outcome of experiencing critical self-reflection. For example, participant 26J expressed:

> *…after our interview I have reflected quite a lot on what we shared… I have also, more generally, noticed my natural tendency to integrate different perspectives into a unifying perspective that makes the best sense of them (26J)*

Participant 24R said:

> *It would have been in the days and weeks afterwards… I have considered how my worldview has been formed and has shifted throughout my life, and will probably continue to shift' (24R)*

Participant 12J shared:

> *I do appreciate more having an understanding for myself of why I have the worldview I do (12J)*

Participant 11M answered:

> *I do recall discussing the interview at length with my wife... [the interview] strengthened in my mind the belief that I am doing things in a correct and ethical way (11M)*

d) Experiencing difficult emotions and a potential transformation of meanings

Participant 39P noticed the potential risk of critical self-reflection by describing how he could have been potentially affected if the interview had occurred in a different moment of his life. He said:

> *I think that I'm in a good moment in my life, and it's easy to question my beliefs…in a different condition maybe it could be hard to question myself, it could bring me to depression maybe (39P)*

Participant 41C also referred to the potential difficulties of critical self-reflection: '*I have also noticed that being asked about religion always evokes a slightly hostile response in me.'* This participant also shared an example of the adjustment of old meanings, or maybe a potential transformation. She expressed her views on religion while answering the online survey; then, at the beginning of the interview, when those views were read loudly to her, she said at first: '*[laugh] Sounds so harsh! Well, it is pretty critical in that sense, like no religion at all!'* Later, she added: '*You realize by thinking that way, that you can be really narrow-minded yourself and I hate that*' At the end of the interview, regarding the questionnaire, she expressed:

> *Answering questions like these you do it more actively [referring to critically self-reflection], and you realize maybe I'm a bit extreme on this way, and I didn't think I was… I always say I'm so tolerant… but when I wrote that thing*

about religion it was pretty bound it was just stupid and I don't want to be like that (41C)

Another participant who felt deeply challenged was 6C, who said:

It's really hard, it's really hard. Sort of realized that it's very difficult to talk… the experience kind of makes you feel a bit like you're not doing enough… when you sort of consider your worldview in relation to other worldviews... so I did find it quite challenging. I don't know but the sort of value–action gap is pretty large. So I know that my worldview is not only sort of a jigsaw of lots of different pieces from other worldviews, probably all plastered together, but it's also based on a set of knowledge and understanding that's probably relatively kind of holey and missing some key bits. So it makes you a bit aware that you need to know more. Maybe it's just me (6C)

During the interview, this participant struggled to find examples of behaviours that could match the perceptions he was expressing. In accordance with the Transformative Learning Theory, that may have been the beginning of this challenging sensation, where he continuously found a lack of alignment or coherence.

e) Identifying other forms of viewing and experiencing the world

Following on from the comparison between one's own worldview and the other three available possibilities offered by the study, two participants reflected on comparing oneself with others. Such comparison allowed them to consider how other people might see the world. Participant 14I said: '*What people's worldviews are… it makes you think about other people's opinions about what's important as well.*' Participant 28R shared: '*It was interesting to try and to think about what my worldview… how my worldview relates to someone who is religious?*' Hence, being asked to self-recognise personal worldviews can make people question who they are, and who they are in comparison to others. As will be discussed further in the next section, this comparison is a crucial component in Mezirow's Transformative Learning Theory, which links

directly with phases 4 and 5 in a transformative learning experience.

f) Analysis and synthesis of results

The examples provided in the five sections above represent participants' acknowledgement of a significant value embedded in the experience of critical self-reflection and self-recognition of their personal worldview. When they identified their worldview as a whole entity, or broke it down into perceptions and behaviours, or while they were answering the open-ended questions in the survey, being interviewed or replying to the follow-up questions – at some point and in different ways – they all shared that, although critical self-reflection is not a common or ordinary practice, it can provide the following benefits:

- Observing the impact of time and how accumulated experiences might have influenced and changed meanings (perceptions and behaviours) allows their possible update (adjustment or transformation). Participants explored the variations in their meanings over time (e.g. the value of updating views described by participants 1E and 21G), suggesting this activity of self-recognition might have enabled them to have identified, and even tried to reduce, attempts to supress or intentionally forget unwanted emotions or thoughts (Wilson 2004), like the moment of self-revelation reported by participant 4Ch.
- Tracking down the origin of meanings and following the continuity, or lack of continuity in their expression over time, allows the identification of gaps between worldviews and behaviours (value–action gap). The identification of the level of alignment between their perceptions and their behaviours is a form of critical self-reflection where people infer their inbuilt meanings by exploring their behaviours and the conditions under which they occur (Wilson 2004).
- Increasing self-awareness about the meanings given to oneself, others and the world allows the identification or reassurance of what really matters in life.

- Becoming more aware of their own personal worldview allowed the recognition and empathetic observation of other people's worldviews, particularly when participants were given a visual description of each of the four worldview classifications and asked to self-nominate the worldview that best represented them. Some participants compared their views against other possibilities (the remaining three types of worldviews), based on the diagram offered – a specific type of critical self-reflection called *symbolic interactionism*, with a long tradition in sociology and social psychology (Cavanna 2014; Cohen 2000).

These are some of the mechanisms through which critical self-reflection occurred. They all imply that participants experienced the opportunity to increase the coherence in their personal narratives (Schooler 2015; Smallwood 2015; Wilson 2002, 2004), probably based on the discovery of possible new meanings, or the updating and adjustment (or transformation) of old ones. Some participants reported that this experience generated confusion and/or new questions, while others expressed reassurance of their identity. In any case, the ultimate benefit might be to reduce the discordance or dissociation between the conscious and the unconscious (Wilson 2004).

As can be observed in the quotes above, critical self-reflection is the most common way in which people attempt to decipher their emotions, thoughts and actions. However, critical self-reflection is less a matter of unearthing buried emotions and thoughts and more a constructive process of gradually inferring what these entities might be and mean. It depends on consciousness, which is a fluid and intermittent experience (Sanders 2016; Smallwood 2008; Smallwood 2015), and on the vast and predominant unconscious, which is dissociated from consciousness and can never be directly viewed through conscious attempts (Wilson 2002b, 2004). Thus, people must endeavour to infer the nature of the contents and processes of the mind, by taking what they know and filling in the gaps of what they do not know by constructing a coherent narrative about themselves (Kochanska 1994; Wilson 2004).

Sometimes critical self-reflection goes awry and has negative consequences. For example, people often focus on incomplete information and construct inaccurate meanings, or may ruminate when distressed and focus on negative information about them, becoming depressed (Sanders 2016; Schooler 2004a). Another negative consequence is reducing the quality of choices and attitudes in terms of one's own wellbeing (Wilson 1991). There are physical and mental benefits associated with maintaining information or meanings slightly or moderately outside of the conscious attention (Wilson 2004; Wilson 1991). However, practising critical self-reflection is desirable because people can succeed in changing, transforming and constructing a more coherent narrative than they held before, with beneficial consequences for themselves, and others (Schooler 2004a; Schooler 2015; Smallwood 2015).

5.3 Self-recognising personal worldviews resembles a transformative learning experience

Sections *5.1 Experiencing the initial self-recognition of a personal worldview as a whole entity* and *5.2 Experiencing a more detailed self-recognition of a personal worldview, its components and expression*, argued that self-recognising one's own worldview has the potential to prompt critical self-reflection, resembling the first five phases of a transformative learning experience (TLE):

1) phase 1 – experiencing a disorienting dilemma
2) phase 2 – experiencing self-examination with feelings of guilt or shame
3) phase 3 – experiencing a critical assessment of perceptions and meanings
4) phase 4 – experiencing the self-recognition of being confronted and the identification of others experiencing the same
5) phase 5 – experiencing the exploration of options for new meanings, roles, relationships, and actions.

When participants were asked to self-recognise their personal worldview, this event:

- prompted emotional appraisals (phases 1 and 2)
- evoked multiple moments of critical self-reflection, the main component of a transformative learning experience (phase 3)
- evoked the curiosity to compare one's own worldview with other types of worldviews (phases 4 and 5)
- uncovered meanings that could potentially help people to strength their own personal narratives (phases 4 and 5)

Being asked to self-recognise personal worldviews and how they manifest themselves in daily behaviours opened the possibility of recognising and reflecting on uncritical underlying meanings, creating the inherent opportunity to change them or replace them with new meanings, which equates to a transformative learning experience.

It is pertinent to clarify that, in this study, the self-recognition of a personal worldview is not understood as a fixed capacity (Northoff 2006) but as a flexible skill which varies depending on the circumstance or context, with the potential to develop further over time (Brown 1995; De la Sienra 2017; Wilson 2004). This is of significant value in the educational context. Although the recognition of the self has not been a mainstream topic in psychology, this chapter shows that it is possible to design tailored experiences aiming to identify, interpret, compare and discuss some of the main features of personal worldviews.

As explained by Mezirow, the volatile, unstable or impermanent mental capacity to critically self-reflect is the crucial element on which his Transformative Learning Theory was built, because of its capacity to increase consciousness by changing meanings (Mezirow 1997, p. 11). His main premise is that people uncritically accept and internalise someone else's perceptions, and it is not until such perceptions are challenged by any given experience – like being asked to self-recognise one's own

worldview – that people are able to critically self-reflect on them and, eventually, transform them into new perceptions formed by new meanings (Mezirow 1997).

A more detailed discussion about the implications of critical self-reflection in the context of learning and Education for Sustainable Development (ESD) will be presented in Chapter 7.

5.4 Summary of the chapter

When participants were asked to self-recognise their personal worldview, critical self-reflection was prompted, resembling the first five phases of a transformative learning experience. Participants in this study struggled to identify their personal worldview as a whole entity, their components, and/or forms of expression, showing inconsistency and variations in their capacity to self-recognise, critically reflect and eloquently express themselves. Regardless of the causes of inconsistency occurring at the time of their participation in this study, the responses of the participants illustrate the complexity and difficulty people face accessing and making sense of their own personal meanings (perceptions) and how they are expressed in their daily life (behaviours). This inconsistency, complexity and difficulty represent a transformative learning opportunity from an educational perspective.

CHAPTER SIX: What are the most significant life experiences forming and transforming a personal worldview?

'The whole of life, from the moment you are born to the moment you die, is a process of learning'

Jiddu Krishnamurti

The previous chapter discussed the narratives shared by the 25 research participants regarding the self-recognition of their own personal worldview. This chapter presents the analysis of the data corresponding to what the participants identified as the most significant life experiences influencing the formation, evolution and transformation of their personal worldview.

From an *educere* perspective to Education for Sustainable Development (ESD), the goal was to identify what types of experiences significantly shape a worldview. As discussed in sections *2.4 The identification of the transdisciplinary gaps and the contextualisation of the research questions*, *3.3.2 Considerations for empirical research questions* and *4.1 The enquiry space and the research questions*, the need was to find crucial elements helpful in the design of innovative educational interventions. This led to the formulation of the fourth research question, the title of this chapter:

> **What are the most significant life experiences forming and transforming a personal worldview?**

After the introduction of the interpretive frame for data analysis in section 6.1, all these experiences are analysed in terms of their influence on the participants' learning processes and the resulting personal worldview. Indeed, these are the corresponding headings for the three upcoming sections: *6.2 Experiences shaping the formation of a worldview, 6.3 Experiences shaping the evolution of a worldview* and *6.4 Experiences shaping the transformation of a worldview*. At the end of the chapter, in section *6.5.The interconnection between life experiences and the nature of worldviews,* a

synthesis of all the arguments and claims made throughout the chapter is provided in order to answer the corresponding research question.

6.1 Interpretive frame for data analysis

This section briefly explains and justifies the interpretive frame constructed and applied specifically to analyse the third component of the interviews. As discussed in section *4.3.2 Methods of data collection: survey, interviews and observation*, this third component required the participants to identify the most significant life experiences they could recognise today as crucial influences shaping their worldview. However, from a qualitative perspective, an experience is a highly complex event difficult to delimit and analyse, due to the converging of multiple variables. Thus, this frame was built to provide a research approach to their interpretation from a perspective on their psychological influence on learning and worldviews; these criteria are explained throughout the frame itself.

This frame integrates the Transdisciplinary Framework on Worldviews and Behaviours (TFWB), Merriam's work on significant learning and life experiences (Merriam 1993), some premises from developmental psychology, the learning theories associated with the *educere* approach to education in Chapter 2 (Experiential, Social and Transformative), as well as the nascent theory of Interpersonal Neurobiology of the Developing Mind (Siegel 2001, 2012), which honours the indivisible character of the binomial nurture/nature.

6.1.1 Formation, evolution and transformation of a worldview

The formation of a worldview was discussed in section *3.2.2 Layer 2: The embodied mind and its worldview.* As soon as the foetus starts developing the senses in the womb, the individual starts processing information and making meaning, mostly unconsciously. Such mental capacities are widely accepted to be determined by both genetics, referred to hereafter as *nature*, and the environment, referred to hereafter

as *nurture* (Bandura 1971, 1977; Crews 2014; Eagly 2013; Kan 2013; Plomin 2014; Taylor 2015), which multiple and permanent interactions give a worldview its unique character.

The neural map serves to create a mental map, a mental representation mirroring the stimuli experienced by the body, named *worldview* in this study. The meaningless schemas are constantly compared and blended, forming interpretations (where meaning starts to unfold) and perceptions (more complex meaning structures), which are also constantly mapped and blended, forming a personal and unique worldview. As the individual matures, their own personality traits – like intra/extraversion, motivation, or consciousness and meta-consciousness, among other characteristics – start to develop, also playing a fundamental role in meaning-making and the formation of the worldview. The role of personality traits in learning is an aspect explained by the Big Five framework of personality traits (Komarraju 2011), which will be further referred to in this chapter.

Some aspects of a worldview are more dynamic, like mental states, attitudes or choices, and some other are more stable over time, like perceptions (Mezirow 1997; Schlitz 2010, 2011). However, there are specific life experiences that are so profound that they shift people's steady state in such a fundamental way that they are forced to change the way they perceive themselves and the world. A worldview transformation is, then, a fundamental shift in perceptions that results in long-lasting changes in people's sense of self, the relationship to the world around, and the way of being in it which, in turn, could be observable through changes in behaviour, for example

The evolution of a worldview could be considered as the steady process of psychological development and maturation, of meaning-making throughout ordinary life experiences, whereas the transformation of a worldview represents a specific moment, due to a specific extraordinary experience, where the worldview is challenged to the point of radical change (Schlitz 2010, p. 18).

Major transformations can be distinguished from minor alterations in people's perceptions because they involve the reorganisation of basic conceptual schemes and their meanings. Major transformations, which are relatively rare in one person's lifetime, imply a '*reorganization of the relations both between features of a conceptual structure and between different conceptual structures*' (Schlitz 2010, p. 20). When a transformation of a worldview happens, it usually involves ontological and epistemological changes in what a person knows and how they know what they know; it is not only behaviour that changes but also the '*motivational substrate*' from which that behaviour arises (Schlitz 2010, p. 20; Schlitz 2011).

6.1.2 Bridging life experiences, psychological influences, learning and worldviews

Merriam's work (1993, 2013) implicitly connects life experiences with the formation, evolution and transformation of worldviews, based on the concept of *significant* learning. This adjective alludes to the influence of the reported life experiences in the participant's learning process. For learning to be significant, it must:

a) have affected her/him either by resulting in an expansion of skills, sense of self, or life perspective, or by precipitating a change or transformation that involves the whole person's meaning system
b) be subjectively recognised by the person as a valuable piece of meaning built (Merriam 1993, 2013a).

In this research, all the reported experiences prompted significant learning because participants subjectively identified these events as moments when they either expanded their skills, sense of self, or life perspective (which this research considers to be part of the formation or evolution of a worldview) or precipitated a radical change or transformation that involved the whole person's meaning system (which this research considers to be part of the transformation of a worldview).

Due to the above, the two main aspects to consider throughout this chapter are:

a) learning is what seems to sit behind the dynamic nature of a worldview (formation, evolution and transformation)
b) learning is a mental process it fundamentally depends on the experience of life in the external environment (Jarvis 2005).

These are the two reasons this interpretive frame delved into further literature connections, aiming to make sense of how the reported experiences of life in the external environment significantly influenced participants' learning processes and, ultimately, shaped their worldview.

The psychological influence that primary caregivers like parents, grandparents and close relatives can have on children's development (usually called *parental influence* or influence from the *family context*) has been the subject of multiples studies with many different approaches, methods and conclusions. For example, the influence can occur through direct interaction, identification, transmission (Kagan 1999), observation, modelling (Bandura 1971; Darling 1993; Sheffield 2007), internalisation (Kochanska 1994) or integration (Hedlund-de Witt 2014b; Ryan 2000). It is also possible to observe in the literature – although less frequently – that these psychological influences related to other people outside of the family context, or to media like movies, television, books and radio (Bandura 1977, 1982). In this study, the narratives from the participants allowed the recognition of these seven forms of influence, mostly related to the family context and, in a few cases, to other people and the media as well. All seven influences will be explained as the analysis evolves throughout the chapter.

Considering this research purpose, the relevant aspect of recognising these influences was their impact on the participants' learning processes. The analysis in this chapter provides an approximation of how this might have occurred, by associating the type of

psychological influence identified with one of the three learning theories discussed in Chapter 2 as part of the *educere* approach to education.

As a brief recollection of such theories, while Experiential Learning argues that meaning is built through direct experience (Kolb 1984; Kolb 2011), Social Learning specifies that, during the experience, it is the interconnection with other people that prompts learning. More specifically, the interconnection happens either by observing and/or by interacting with someone else's behaviour and the corresponding consequences of such behaviour (Bandura 1971). Going deeper into social interactions and learning, the Interpersonal Neurobiology of the Developing Mind (Siegel 2001, 2012) argues that communication patterns of emotional connection influence neural patterns of molecular connection and vice versa (Siegel 2001, 2012). On a separate but related note, the foundational proposition of Transformative Learning is that certain types of experiences prompt the intention to access, analyse (critically reflect) and radically change conflicting underlying meanings given to the experience at hand (Hoggan 2017; Imel 1998).

In sum, this interpretive frame to data analysis considers a significant life experience as the point of convergence for nature (intrinsic characteristics like genetics, personal traits and own worldview) and nurture (the environment and, mainly, other people's nature). Energy and meaning flow, either a) prompting an expansion of skills, sense of self, or life perspective (contributing to the formation or evolution of a worldview), or b) precipitating a radical change or transformation that involved the whole person's meaning system (transforming a worldview). In this chapter, this frame is used to identify the main components of the reported life experiences influencing the participants' learning processes, which, in turn, seem to be directly shaping the formation, evolution and transformation of their worldviews. For this reason, these reports are considered potentially helpful to guide the design of innovative educational interventions.

6.2 Experiences shaping the formation of a worldview

The 25 research participants referred to their childhood – specifically, the family context (nurture) – as the most significant source of influence in the formation of their worldview. In addition, eight people made a few comments on the school context (nurture). Only three people talked about their own personal traits or intrinsic characteristics (nature). These are the same three categories reflected in the headings of this section. Through concrete examples from the participants' narratives and the implementation of the interpretive frame presented above, this section analyses the main components of the reported life experiences directly shaping the formation of the participants' worldviews.

6.2.1 Interacting with carers' worldviews

In this section, reported parental influences are discussed, showing how different aspects from the carers' worldviews are the main components influencing the formation of the participant's own worldviews. A reminder from the interpretive frame is that each of the seven forms of psychological influences considered in this study (internalisation, observation, integration, direct interaction, modelling, identification and transmission) will be explained as the analysis develops, relating them to the main premises from the Experiential and Social Learning theories (Transformative Learning will be referred to only in the corresponding section *6.4 Experiences shaping the transformation of a worldview*).

The influence named *internalisation* refers to the mental capacity of the child to absorb information and reconstruct an external experience (Tudge 1993), involving early signs of self-awareness and emerging self-regulation (Kochanska 1994). It can happen as a multidimensional phenomenon where other influences intervene – for example, observation (Kochanska 1994). Internalising from observation involves looking at the behaviour of others as the starting point (Bandura 1982).

An example of how a life experience can prompt this type of psychological influence in children's learning comes from participant 16B, who shared: '*I can remember my grandfather, he used to draw and paint and I liked to see him, I wanted to do what he did, and he taught me'*. Observing a specific behaviour or action from her grandfather is what this participant recognised as one of the most significant life experiences forming her worldview. She described how it personally affected her and resulted in an expansion of her skills (if not also of sense of herself); that she chose it during the interview means that she subjectively valued it as significant (Merriam 1993). In the learning terminology provided by Social Learning, this event could be described as a process of learning by observation, which helps the learner to encode what they observe and store it in memory for later exploration (Bandura 1982). Participant 16B also reported that her grandfather taught her to draw and paint, which implies a shared activity (more than observation), learning by experience, and reflecting on doing, an experiential approach to learning (Kolb 1984).

The paragraph above clearly reflects the challenge involved in the qualitative analysis of a significant life experience, in which multiple variables converge and multiple approaches can be taken. Additionally, the related literature can sometimes be messy. For example, regarding the type of influence named internalisation, it is possible to find reflections like this one: '*How internalization occurs is a question that has long fascinated psychologists. The attempts to explain it have originated within many conceptual perspectives*' (Kochanska 1994, p. 20). Despite this challenge, the use of the frame in this work does seem to provide some insights, allowing the identification of some of the main experiential components shaping the participants' worldviews. In the case of participant 16B, it was her grandfather's behaviour: an expression of his own worldview.

While internalisation refers to the capacity of the child to absorb information from the experience at hand (Tudge 1993) with early signs of emerging conscience (Kochanska 1994), *integration* refers to the further interpretation and critical adjustment of such

information so that, subsequently, it will emanate from an own sense of self (Hedlund-de Witt 2014b; Ryan 2000). Integration alludes to the conscious or meta-conscious process (in Schooler's tripartite model explored in section *2.2.1 The processes of the mind: intelligence, learning and memory*) involving a judgement of the internalised information by the individual (Kraiger 1993). An example of integration comes from participant 41C, who reported some critical adjustment of the information gathered from the family context into a more meaningful piece in her own worldview. She referred to the difference between her parents' views and opinions in general:

> *I think it's just the difference in opinions that my mum and dad have, because they have very opposite views on things… but I have this really healthy balance… you always get those two opposite sides and I'm somewhere in the middle (41C)*

She also said:

> *I think that is a selfish perspective that I get from my mum… where I always evaluate how much something is going to help me personally… and I think that is pretty selfish sometimes [laughs], but I think my mum raised me like that… (41C)*

In both cases, this participant is reporting a processes of integration where the information observed, heard and gathered became internalised first; it was then judged and adapted in a useful manner according to her own criteria. In this case, it is also evident that what is actually reported is learning from experiencing social connections in her family context.

A clear example of another psychological influence named *direct interaction* was provided by participant 11M. He referred to his father's views on education (sociological perceptions) while describing his choice of career:

> *…so, what was the thing that pushed it over? Basically my father, he wanted me to go to university, he was just like 'I think that education is very, very important, and I think that you should go to university (11M)*

Instead of a process of observation, internalisation or integration, the expression '*pushed it over'* could be more related to a process of direct interaction (Kochanska 1994). In this type of psychological influence from everyday events, the parent transfers knowledge to the child (through an opinion, for example) with subtle or implicit rewarding of desirable actions (or punishment of undesired ones), which has a cumulative effect (Kagan 1999). In a similar example of the powerful impact that one parent's single opinion can have on their children's worldview formation, participant 43H commented on his mother's sociological perceptions:

> *I think one event was, very strong, when I was 14 years old… and she [mother] said something very interesting… and I've always remember that very well, this idea of modernity and development marked me (43H)*

As observed in both examples, direct interaction seems to have been a primordial component in a social learning process, where both participants reported experiencing a relevant moment for their own future understanding (or meaning-making), due to a specific interaction they had with their parents.

Modelling is a distinctive point of convergence between developmental psychology and experiential/social learning theories. Classical behaviourist theories relied entirely on the impact of direct experience (of the stimulus) to inform behaviour – until Vygotsky and Bandura (Bandura 1977, 2004; Tudge 1993; Vygotsky 1966) opened up the scope of learning mechanisms by introducing observation as a possibility, with the inherent potential for modelling. Although observation was mentioned before, in participant 16B's comment about observing her grandfather paint, in that case the grandfather's intention was not involved; it was reported as a fortuitous experience. In the context of modelling, learning from observation can be intentionally influenced by a model, which could be:

a) live models, where a person is demonstrating the desired behaviour (usually recognised as a role model)
b) verbal instructions, in which an individual describes the desired behaviour in detail and instructs the participant in how to engage in the behaviour
c) a symbolic model, in which modelling occurs by means of the media, including movies, television, the Internet, literature, and radio (Bandura 1971, 1977, 1982, 2003, 2004; Tudge 1993).

An example of modelling by the observation of someone else's intentional behaviour was provided by participant 6C, who shared:

> *…my grandfather, I held up as a huge influence… he was… reliable… generous… caring… really level-headed, and he just sort of never reacted to stuff, he never let anything get to him (6C)*

From this quote it could be inferred that, even in critical times, his grandfather aimed to behave in exemplary ways, allowing his grandson to learn by modelling. This participant described experiencing his grandfather's responses, learning by experiencing social interactions within the family context.

Another element of complexity in the qualitative analysis of life experiences and multiple variables interwoven is the possibility to identify more than one psychological influence. From the same quote above provided by participant 6C, it could also be inferred that a process of integration, where his grandfather's values (axiological perceptions), attitudes and behaviours were not only observed and absorbed but also, at some point in the participant's mental development, critically judged and assigned a specific meaning.

The psychological influences named identification, or imitation, and transmission are closely related in the literature, almost used as synonyms, mainly referred to as the

foundations of culture. Children unconsciously choose to copy some of the attributes of their parents as part of their own repertoire, with high levels of fidelity across contexts and in the absence of causal information (Carr 2015). For example, before the age of 4 children can be already imitating the religion to which their family belongs, often feeling '*an imperative need to honour the identification'* (Kagan 1999, p. 165). Failing to do so would be to violate a principle of cognitive consistency between a religious or ethical standard and an action – hence evoking feelings of uncertainty, except in some adolescents who need to minimise the bases for the perceived similarity (Kagan 1999). Religion can be considered a cultural phenomenon usually explained by the intergenerational imitation (from a children's perspective) and transmission (from a parent's perspective) of attitudes and behaviours (Maccoby 2000).

Five empirical examples of imitation/transmission described above are represented as follows:

- *My parents… so they will question the church so I basically went along with the questioning of the church, rejecting the church (5N)*
- *I'm not much of a spiritual person no, my parents they aren't religious (36A)*
- *I'd tell it all starts off with my parents… they were normal believers and they never pushed me to do anything… but we picked it up from them (8B)*
- *…as a child the one thing that stands out is the spiritual aspect, because my father used to be a pastor… that aspect was the thing that was placed above everything else (9T) I think the family context… it's just having that connectedness to your family and growing up in a household that you're already taught those values and you can see how it works in the world already (12J)*
- *…a big part is really my family, my parents, I grew up in a very religious, spiritual family… so, yeah definitely and that's my upbringing and I brought that with me into adulthood, into the present (4Ch)*

These examples represent the imitation, or transmission, of the family ontological system. None of these could happen without observing or experiencing other people's behaviours; therefore, it could be drawn that these psychological influences are inherent to learning from the social context.

As observed throughout this section, experiencing social relationships within the family context was reported by all participants as the main source of significant learning, shaping the formation of the participants' worldviews. The carers' worldviews, expressed through behaviours (including the act to converse and share opinions), were reported as the main source of psychological influence (through internalisation, observation, integration, direct interaction, modelling, identification and transmission) in the early meaning-making (learning) processes of the participants, where they identified the formation of their own worldview. In the following section, the exploration of social relationships experienced in the school environment is reviewed.

6.2.2 Interacting with other people's worldviews within the school context

In addition to the family social interrelationships during childhood, the social interactions within the school context were also reported as significant experiences in the formation of a worldview. Based on an *educare* approach to education, the psychological influence that school can have on children's behaviour has been mainly attributed to factors such as the curricular content, assessment strategies, teachers' performance or the classroom disposition, among other factors (Sylva 1994). However, in this study, the eight participants who mentioned the school influence referred only to the social setting, recognised by the *educere* approach. The interaction with other people – mainly other students, and also some teachers – in the social setting of the school years is what was reported as forming significant experiences shaping the formation of a worldview.

Research on the specific influence of the school's social context on children's development is quite scarce in comparison to the abundant literature focused on the analysis and assessment of the curriculum efficacy, skills acquisition, evaluation tools, and implications of test scores, among other elements (Stemler 2011). In the search for information about the specific impact of the social context at school, some relevant contributions came from those described in section *6.1. Interpretive frame for data analysis* as well as some texts on the study of the role of play (Gestwicki 2011), learning outside the classroom (Malone 2008), and some other less explored topics like the influence of different languages (August 1997), perspectives on friendships (Berndt 1991) or the influence of opinions coming from majorities against minorities (Moscovici 1980).

To exemplify the influence of social interactions at school, a fragment in the narrative of participant 24R shows how observation initiated a process of internalisation and then integration. First, she contextualised: '*playground experiences, seeing other children being bullied or victimized'.* Then she reported how such experiences prompted her to discern between desirable and undesirable behaviours, gave her a sense of unfairness and also provoked her own feelings of fear and intimidation: '*…an understanding that was unfair some way… it's very frightening to confront or to stand up against the group'.* She also described how she reflected on her own behaviour (actions or lack of actions) and her empathy: '*…so those sorts of thoughts and regrets were really important in thinking what you do and how you should behave and what is best for other people'.* This participant made evident that informal social interactions at school can deeply impact emotions, thoughts and actions, prompting a critical assessment of meanings and a significant learning process.

An example of direct interaction or modelling (by verbal instructions, in which an individual describes the desired behaviour in detail and instructs the participant in how to engage in the behaviour) comes from participant 16B, who said:

> *I remember this teacher in 6th grade questioning me about something that my mother didn't do and telling me that I could have done it myself, in the sense of me being capable of, smart enough, with all the potential to do that and more; and I remember that was a pivotal point because since then I started looking for information and books and wanting to learn and know and do more (16B)*

Her reflection comes from the fact that children can be led towards the outer bounds of their own competence by a skilful tutor (for example, a family member or a teacher) who aids motivation, curiosity, responsibility and self-efficacy (Bandura 1977; Sylva 1994, p. 142).

Experiencing other peoples' worldviews through social relationships has different forms of influence in the meaning-making (learning) and formation of a personal worldview. Experiencing social relationships (by observation, modelling or direct interaction, for example) is the major influence in children's learning. The quotes above exemplify this learning circumstance; these examples point out how psychological influences can come also from other people's behaviours that are different to those of family members. Social relationships at school can prompt emotions, reflection and certain actions by observing others' behaviours and making decisions about them (Bandura 1971, 1977, 1982; Tudge 1993).

Of all the possible influences that the formal educational environment can have on the formation of worldviews, participants in this study reported only the social interactions as the most significant, which mirrors the literature on the fundamental, vital role of social relationships in experiences of significant learning (Abrams 1989; Adolphs 2003; August 1997; Bandura 1971; Cauffman 1996; Merriam 1993; Piaget 1952; Salomon 1998; Siegel 2001; Sylva 1994, p. 163; Tudge 1993; Vygotsky 1966).

Complementing the previous two sections, in which nurture was discussed (in the family and school contexts), the following section places the focus on individual nature, the participants' perspectives on their own intrinsic characteristics.

6.2.3 The influence of intrinsic characteristics

The interpretive frame in this chapter recognises the role of the mutual impact between nurture and nature in shaping the uniqueness of a worldview. Particularly, section *6.1.2 Bridging life experiences, psychological influences, learning and worldviews* argued that, as an individual matures, their own personality traits start to develop, playing a fundamental role in early meaning-making and the formation of a worldview. However, in correspondence with the dominance of the *educare* approach to education, which prioritises standardisations, the investigation of personality traits in learning is also quite scarce (as the specific influence of the school's social context, explained in the previous section). Research on multiple intelligences (Gardner 2014a; Glazzard 2015; Vardin 2003), learning styles and personality types (Cassidy 2004; Glazzard 2015; Kolb 2005) helped identify the Big Five framework of personality traits (Komarraju 2011) as a possible reference about the influence of personality traits on certain aspects of learning (Giluk 2015; Katrimpouza 2017).

The three narratives shown below referred to two of the five personality traits covered by the Big Five framework: *openness*, reflected in a strong intellectual curiosity and a preference for novelty and variety, and *conscientiousness*, exemplified by being disciplined, organised, motivated and achievement-oriented. Curiosity and motivation were the two personality traits self-recognised as possible influences in these three participants' learning abilities and determination (Komarraju 2011).

When asked about significant experiences shaping his worldview, participant 27J said:

> *I read voraciously from an early age, so I think that's one aspect that I've always got a fair amount of understanding from characters and situations and nouns.*

Participant 25S shared:

> *…my own decisions, which would have been devised from media, so a lot of television, movies, a lots of books, readings, and… the books that we would have read from life stories (25S)*

Through these two quotes, it is also possible to recall curiosity and one of the three variants of the modelling psychological influence, described above in section *6.2.1 Interacting with carers' worldviews*, which include a symbolic model, in which learning occurs by means of the media – including movies, television, Internet, literature and radio – where stimuli can be either real or fictional characters (Bandura 1971; Tudge 1993).

Participant 16B described her motivation: '*I managed to overcome myself and become stronger, and now I can do all of that because I pushed myself to do it*'. Further, she said: '*Nobody took me there. I used to go by myself as a kid because I enjoyed listening to what they were saying to the children.'* Finally, she said:

> *I was just walking around the city, discovering music, markets, culture, museums, art, and then everything started to change, I felt attracted to all this new knowledge around me… I developed a strong sense of belonging… I felt identified with other visions of the world, and I can see how all these elements that have been with me since childhood, have helped me to change my views of the world as I grew up (16B)*

Throughout her narrative, it is possible to identify moments when she is subjectively valuing her own motivations to explore or push herself. Those were the moments she chose as significant experiences shaping her worldview. She did not report direct interactions with other people but more self-experiencing – hence exploring new possible meanings.

As mentioned at the beginning of this section on formation of worldviews, the 25 participants referred to the social interactions in nurture (family and school), and only these three mentioned their own intrinsic characteristics. This is in itself the important result to consider, due to the absence of reported narratives of self-recognition of participants as learners, which is an area for educational opportunity from an *educere* approach. As listed in section *2.4 The identification of the transdisciplinary gaps and the contextualisation of the research questions*, at its core, the *educere* approach involves a gradual process of self-exploration of inner capacities and the self-recognition of one's own potential. This deficit in the participants' narratives represents opportunities for learning design.

6.3 Experiences shaping the evolution of a worldview

It is difficult to establish the limit between experiences shaping the formation of a worldview and experiences shaping its evolution. However, in this study, if the participant described a moment of change in meaning, with no explicit description of a highly challenging event (a disorienting dilemma with discomfort or dissatisfaction), then such experience was considered as part of the evolution of their worldview. Thus, in this section, evolution encompasses moments of steady, subtle or gradual change; evolution is considered a process of constant adjustment of meanings. Transformative experiences, where change also occurs but in a more radical form and usually prompted by disorientation, discomfort and dissatisfaction, are compiled in the following section *6.4 Experiences shaping the transformation of a worldview*.

The experiences reported as significant in shaping participants' worldviews, and considered in this section as triggers of evolution, covered the period from adolescence to adulthood. Although the preferred life experiences differed (e. g. moving into a different country, commencing a new job, enrolling in university, finding a romantic partner, having a baby), they constantly alluded to experiencing new social relationships (experiential and social learning). Therefore, knowing new people in

different places, contexts and from different cultures is the common element in the experiences reported where meanings were adjusted. Being in constant contact with different worldviews is what seems to have shaped the evolution of the participants' worldviews.

Section *6.2 Experiences shaping the formation of a worldview* made evident that, while social relations in childhood can prompt learning by observation, imitation, transmission, direct interaction, and modelling (particularly in the family and school contexts), at some point in the psychological development of the child, internalisation with early signs of consciousness or integration with clear signs of meta-consciousness and critical reflection starts to occur as well. Two participants described moments in their adolescence in which they made their own decisions about their meanings and identity. They shared a moment where they had to define a new position for themselves, in relation to old meanings they had apparently imitated or internalised earlier in life but later adjusted and acted out (Wals 2007, 2013).

At the core, both narratives share the exposure to different possibilities to perceive as the element prompting this need to decide and adjust their own meaning. Participant 28R said:

> *…my father was an active trade unionist… my mother is a Christian… so I went to Sunday school until I was maybe fourteen or fifteen, but then I think I kind of followed my Dad's path more and became sort of interested in that social justice angle (28R)*

Participant 43H was narrating having met new people:

> *…and someone asked me if I was Jewish… and I said 'I don't know exactly my family is but I don't know about myself'… I started to inform myself about the Jewish identity and I didn't really like it… I wanted to develop my own opinions and lifestyle, so that was a critical moment in my life, identifying my own identity (43H)*

These two examples display moments of critical self-reflection and subjective judgement (integration) on the information originally imitated or internalised in the family context, which led to a change in ontology.

Other participants provided narratives referring to their young adult lives. Their descriptions constantly alluded to the experience of human diversity, such as being exposed to a different type of worldview, in a different context or culture. For example, participant 1E explained that she had been exposed to different cultures since she was quite young. She described her experiences of constantly moving between two different countries: '*It made me question everything, how I did it in my home environment and in my city, just why we do things in a certain way.'* Participant 24R made evident that within the same city it is possible for different types of worldviews to coexist; she described moving into a different neighbourhood when she got her first job: '*That was realizing that there were very different worldviews within my own culture.'* She reported that as she interacted with different types of worldviews she was exposed to different ways of being and to people thinking or acting differently, which prompted self-reflection.

Experiencing new social interactions within the working space was another situation reported by several participants. Some people described the first job they had, as young adults, as a significant life experience, due to the possibility they had to interact with different types of worldviews. Participant 27J said:

> *…working in a factory and meeting people from a completely different walk of life than my own... so the realization there that I'd been privileged in the opportunities that I'd been given... and all the ethical dilemmas that come along with that realization (27J)*

Participant 25S shared:

> *…and I think when you go into the workforce… you are also meeting again other people, who've got more life experiences, and you're exposed to those*

experiences by being with them… I think everybody influences other people (25S)

These two examples show how meeting new people in the workplace became a point of reference to which they self-compared. In addition to the integration process mentioned above, where critical self-reflection prompts the adjustment of old meanings, another psychological influence represented in these narratives is transmission.

Sections *6.1.2 Bridging life experiences, psychological influences, learning and worldviews* and *6.2 Experiences shaping the formation of a worldview* mentioned the process of transmission very briefly. At this point in the analysis, this type of psychological influence can be explored further through the concept of storytelling, which is the act of sharing one's own stories with other people. The impact of this act on the listener comes from the opportunity to explore and '*work through the complexities of being ourselves in a world that is not us'* (Brushwood 2013)[5]. Both participants above (27J and 25S) implicitly and explicitly referred to storytelling as the mechanism through which they experienced critical self-reflection (and a likely adjustment of their own perceptions, like the axiological ones, as implied by 27J).

Among many other life events reported as providing opportunities to experience different ways of being – different types of worldviews – was attending university. This event was reported on several occasions to be moment of significant learning because of the experience of forming new social relationships. The most representative narrative in this context was provided by participant 4Ch. She described being raised as a Catholic, and how inconceivable it had been to marry an atheist; then she described how going to college represented an opportunity for her to interact with many other forms of spirituality, and people with different religions. It was then when she reported: '*I met my husband, he's actually an atheist… my worldview of spirituality kind of opened up.'* Attending university was reported as a significant life experience

[5] The impact of this act on the teller was discussed in Chapter 5.

because it provided her with the opportunity to explore other forms of being in the world, to the extent of transcending her internalised childhood meanings and doing what she had previously perceived as being inconceivable.

Participant 11M shared two important reflections. One relates to the adjustment of meanings prompted by becoming a parent, which also implies experiencing a new relationship with a new person. He said:

> *…having children, definitely… made me re-evaluate what was important and what I should get worked up about, I guess over the years you just realize that there's certain things that you can't control (11M)*

The second reflection shows how he moved beyond one single experience and reflected on the overall continuity of life events. He has been able to experience human diversity: '*I've interacted with a hell of a lot of people, and those people come from really disparate walks of life.'* As a single event (like becoming a parent) or as a continuum of experiences, participant 11M showed that interacting with others prompts constant adjustment of meanings.

As has been highlighted in this chapter, the psychological influences from social relationships are the main components prompting significant learning and shaping worldviews. Section *6.2 Experiences shaping the formation of a worldview* showed how social relations in childhood shape the formation of a worldview; this section made evident how social relationships continued to be reported as the significant elements shaping worldviews over time. Regarding the evolution of worldviews, the reported interactions with other worldviews is what allowed participants to question themselves, which seemed to prompt subtle changes towards higher levels of understanding – or perception (Carolan 2008; Sherburne 1966), reality (Nicolescu 2012), or consciousness (Schooler 2015) – through a process of significant learning (Merriam 1993).

This section has also highlighted that learning is not confined to childhood: it is a mental capacity that takes place throughout life and in a range of different situations (Bolhuis 2003). Learning occurs on an ongoing basis from daily interactions with the world inside and outside an individual, where others are constantly present (Aspin 2000). Reported significant experiences shaping the evolution of a worldview include the constant exposure to, and interaction with, other possible worldviews over time.

6.4 Experiences shaping the transformation of a worldview

This section focuses on significant life experiences identified by participants involving a change of meaning and also a conflicting dilemma. These experiences prompted some moments of disorientation, discomfort and dissatisfaction, resulting in a more radical change than those discussed in the previous section. So far, Experiential (Kolb 1984) and Social Learning (Bandura 1971) have been associated with the psychological influences identified in the narratives; however, as mentioned in the interpretive frame in sections *6.1.2 Bridging life experiences, psychological influences, learning and worldviews* and *6.2.1 Interacting with carers' worldviews*, the experiences compiled in this part of the chapter show a closer connection to the Transformative Learning Theory.

As explained in section *6.1.1 Formation, evolution and transformation of a worldview*, some aspects of a personal worldview are more stable (Mezirow 2003), becoming quite rigid and resistant to change over time. However, as explained in section *6.1.2 Bridging life experiences, psychological influences, learning and worldviews*, there are times when an experience is so profound that it shifts an individual's steady state in a fundamental way (Mezirow 1997; Mezirow 1990; Schlitz 2010, pp. 19-20; Schlitz 2011). Thus, a worldview transformation is recognised as a deep shift in those rigid perceptions (or an entire meaning system), resulting in long-lasting changes in a person's sense of self, understandings about the world, and way of being in the world (Mezirow 1997; Mezirow 1990; Schlitz 2010, 2011; Sharma 2007, pp. 1-2).

In this study, three participants reported a clearly significant experience where their worldview was profoundly challenged, reporting a deep transformation in their meanings. One of them is participant 41C, who described a radical change in her ontological beliefs after experiencing a distressing situation as a child:

> *When my Grandpa died… that whole bubble kind of burst, it just kind of hit me in that sense that there was no point in believing that. People die because they're sick and not because it's controlled by some supernatural thing, so that formed that part of the epiphany (41C)*

A distinctive feature in Transformative Learning is that the experience that prompts the intention to access, analyse (critically reflect) and radically change ingrained meanings is that of emotional conflict, like pain, fear or anxiety, produced by those underlying meanings given to the experience at hand (Hoggan 2017; Imel 1998). It is an emotionally challenging experience that prompts the need to reconceptualise the experience, and it might take years before the new meaning is given (Holvenstot 2012; Malkki 2012).

When asked about significant life experiences shaping her worldview, participant 23N referred to her adolescence, when she went to work to a different country. She expressed:

> *But it actually was very, a really difficult experience in many ways, being sort of living with a completely different family with completely different values… so, at a certain point you end up feeling quite alienated in the sense that you sort of lose, it's quite a dislocating kind of feeling… so, that kind of experience, I suppose, it changes how you think about what's important…. (23N)*

This quote implicitly shows how she lost her sense of self. While experiencing new social interactions with different people was described in the previous section *6.3 Experiences shaping the evolution of a worldview* as a positive experience, here the exposure to different worldviews and ways of being became a challenge that was

'*really difficult*' and '*dislocating*' and made her feel '*alienated*'. These emotions could be associated with the Transformative Learning explanation of losing meaning and grieving the meaning lost; transformation involves grief before growth (Malkki 2012). This is indeed the central contribution of this theory: it enabled an explanation of how significant meaning-making can emerge in an emotionally chaotic situation, a phenomenon not understandable from within existing learning frameworks (Hoggan 2017; Malkki 2012).

Participant 26J was able to describe how she transitioned through the four possible types of worldviews contemplated in this study (Hedlund-de Witt 2014b, 2014a). She narrated different life experiences where significant learning prompted a transformation of different aspects of her worldview. She started by saying:

> *…so having that upbringing [conservative Christianity], and then I think I've probably moved on through this wheel [diagram with the four types of worldviews[6]] because I rejected that… (26J)*

At this point she had described what she considered a very traditional family context with an ingrained and intergenerational (transmitted) ontological view of the world. Probably based on a similar moment to those described earlier by participants 28R and 43H in section *6.3 Experiences shaping the evolution of a worldview*, the psychological development of this participant reached that level in which internalisation with early signs of consciousness or integration, with clear signs of meta-consciousness and critical reflection, started to occur, prompting dissatisfaction and the need to explore further new possible meanings. She referred to her upbringing as '*quite fundamentalist*' and '*like a complete bubble where this is the truth and everybody else who has rejected the truth… is going to hell, type of thing [laughs]*'.

[6] See diagram of four types of worldviews in Appendix D.

She described getting into business, modelling and travelling:

> *…and had quite a materialistic partner and he was very much in the Modern view... and I sort of got sucked, sucked up a little bit with that, and then went on to see the emptiness of that, and so I had a quite clear rejection of those values… (26J)*

This is a second moment in her life when she reported to have felt dissatisfied; she had broken up with her partner, and reported feeling '*quite soulless'*. For the second time in her life, the meaning or purpose of her life, or her sense of self, was lost.

She went back to her hometown:

> *…and I ended up studying Peace and Conflict Studies, which is probably mostly in the Postmodern… I learned about all the different perspectives and at the same time though still going through my own journey of a need to make sense of my upbringing, and my story and life experiences and sort of a desire for knowledge… (26J)*

Here, in her own words, she again recognised the need to make sense of her identity. What came after this moment during the interview was her description of how doing research on peace and conflict made her appreciate the diversity of worldviews that people have created, and how they can create conflict but also peace. There was a sense of relief and even healing through her words, a perception she herself confirmed:

> *…and seeing how I could contribute to the peace and conflict studies... I guess, most of my research has been driven by an internal desire to integrate… in the end… that's where I've been able to make sense of my family's values and values of friends and I think that's where I've ended up very much in the Integrative worldview… (26J)*

First, in her adolescence, she felt the need to explore further because the ontological view transmitted during childhood had lost its significance. Then, feeling soulless and again having this need to find a new purpose, she reinvented herself. Later, the emptiness showed up again and forced her to keep exploring the meaning of her life until, as reported, she found it.

Participant 26J's narrative clearly represents the foundations of the Transformative Learning Theory. After experiencing the loss of significance in the underlying meanings given to her experiences (maybe by imitation, transmission, direct interaction or observation during childhood), there were moments of internalisation and integration, where grieving led to growing.

In the context of learning and how it shapes worldviews, integration is not only a term to define a psychological influence but also '*presupposes renewal and something that has not existed before it is born*' (Kallio 2011, p. 796). Thus, *integration* (of meanings) can be analysed in close proximity to *transformative* (experiences), because the former implies renewal by the creation of meaning that had not existed before; indeed, the term *transformational integration* involves mental steps taken by the individual to integrate old or new interpretations, and to create new significance (Kallio 2011), equivalent to the transformation of a worldview. Grieving the loss of old meanings allows mental maturation, epistemological growth by integration of those old meanings into new conceptualisations.

Models of wisdom, adult cognitive development, epistemic understanding, or embodied cognition, to mention some examples, explicitly include the integrative tendency of the mind when building meaning (Rowley 2007; Siegel 2012). Such a fundamental characteristic has the potential to develop more complex levels of significance, involving various psychological domains (like consciousness); hence, it implies increasing opportunities for a change in perceptions (Kallio 2011) – even the deeper transformation of perceptions, meaning systems and the entire worldview

(Hoggan 2017; Sharma 2007). The mental capacity to learn involves transformation when contrasting meanings are discarded, modified or renovated and then transformed into new possible explanations to the experience (Mezirow 1990).

6.5 The interconnection between life experiences and the nature of worldviews

In this section, the patterns identified through the data analysis in this chapter are discussed, synthesised and integrated. Premises on developmental psychology guided the identification of the main influences on learning that occurred during the reported experiences; then, learning theories guided the identification of significant meaning-making, shaping a personal worldview. A synthesis of all the arguments and claims made throughout the chapter is provided here in order to answer the corresponding research question.

The most significant life experiences **forming the participants' worldviews** were very diverse; however, some patterns can be identified:

- All the reported experiences belonged to their childhood.
- The common source of psychological influence among the 25 narratives was experiencing (Experiential Learning) the social (Social Learning) interaction with carers and close relatives, in the family context.
- Eight participants also referred to experiencing the social interaction with other children and with some teachers, in the social school context.
- At home or school, the social interactions psychologically influenced the participants in seven identifiable ways: internalisation, observation, integration, direct interaction, modelling, identification and transmission.
- People also mentioned experiencing (Experiential Learning) the influence of their own personal traits or intrinsic characteristics.
- All the reported influences prompted significant learning because the participants' subjectively valued an expansion of skills, sense of self, or life perspective.

The most significant life experiences forming the participants' worldviews involved unconsciously, consciously and meta-consciously learning through experiencing social connections in the family and school contexts. From observation and identification or imitation (where children unconsciously choose to copy some of the characteristics of their parents' identity as part of their own), to internalisation (with early signs of emerging conscience) and integration (with further interpretation and critical adjustment of internalised information, or meta-consciousness), what is actually reported in childhood experiences is learning from social interactions.

The main elements in the social interactions influencing the formation of the participant's own worldviews are considered in this study as attributes from other people's worldviews. Implicitly or explicitly reported in each significant life experience, behaviours, attitudes, values and beliefs were the main components alluded to in the narratives and considered in this research (based on the TFWB) as different components or expressions from the carers, close relatives, other kids, or teachers' worldviews. More specifically, the carers' worldviews, expressed through actions and behaviours – including the act of conversing, or sharing opinions – were reported as the main source of psychological influence in the early meaning-making (learning) and formation of the participants' own worldviews.

The most significant life experiences contributing to the **evolution of the participants' worldviews** were very diverse events, but some commonalities can be identified:

- All the reported experiences occurred from adolescence to young adulthood.
- The common source of psychological influence among the narratives was experiencing (Experiential Learning) new social (Social Learning) interactions. In all narratives corresponding to this aspect, participants reported meeting new people and learning through their life experiences, throughout constant life encounters.

- All the reported influences prompted significant learning because the participants subjectively valued an expansion of skills, sense of self, or life perspective.

While social relations in childhood can prompt learning by observation, imitation, transmission, direct interaction and modelling (particularly in the family and school contexts), at some point in the psychological development of the child, internalisation with early signs of consciousness, or integration with clear signs of meta-consciousness and critical reflection, start to occur as well. As observed in the analysis, two participants referred to experiences in their adolescence as moments of significant learning. It is during adolescence when the integration process (critical thinking) starts to become more evident, due to their psychological maturation and need for autonomy (Bell 2014). In these two cases, it was the interaction with other people that led to participants changing their ontological perceptions.

Experiencing new social interactions was also reported as significant throughout young adulthood. Being in contact with new people's behaviours, beliefs, values and narratives – referred to in this study as components and expressions of worldviews – was reported to be the main source of significant learning. Transmission through storytelling and integration were the main influences reported in adulthood. Exchanging meaning with other people was reported to have allowed participants to question themselves, prompting subtle changes towards higher levels of understanding, perception, reality or consciousness through a process of significant learning in which they subjectively valued an expansion of skills, sense of self, or life perspective. Being exposed to different types of worldviews was reported as being exposed to different ways of being, to people thinking or acting differently, prompting gradual self-reflection and a constant adjustment of meanings.

The most significant life experiences **transforming the participants' worldviews** were different experiences sharing a common characteristic: the emotionally challenging

loss of and grief for old meanings, leading to the renewal or creation of new meanings, involving the whole person. At different ages, these reported experiences showed how the participants' worldviews were challenged, prompting difficult emotions which triggered critical self-reflection and the readjustment of meanings through a psychological integrative process. These experiences prompted moments of disorientation, discomfort and dissatisfaction, resulting in a more radical change than those discussed in the previous section; thus, these experiences showed a closer connection to the Transformative Learning Theory.

A distinctive feature in Transformative Learning is that it is an emotionally challenging experience that prompts the need to reconceptualise such experience. The mental capacity to learn involves transformation, when contrasting meanings are discarded, modified or renovated and then transformed into new possible explanations to the experience (Mezirow 1990). Grieving the loss of old meanings allows mental maturation, epistemological growth by integration of those old meanings into new conceptualisations. Transformation involves grief before growth (Malkki 2012).

As in the formation and evolution of participants' worldviews, the transformation of their worldviews was also prompted by social interactions with people with other worldviews. For the participants in this preliminary study, ingrained aspects or depths of a worldview, like those described in section *6.1.1 Formation, evolution and transformation of a worldview* as more rigid, also depend on social connections for transformation. As explained earlier in this section, this research classifies such connections as interactions with other people's worldviews. People's circumstances (i.e. death), actions and behaviours, including the act to converse and share opinions (where attitudes, values and beliefs are included in the narratives), were implicitly or explicitly reported in each significant life experience as the main source of psychological influence in the transformation of worldviews.

As explained at the beginning of this chapter, the aim in this part of the analysis was to identify learning opportunities from an *educere* approach to ESD, crucial elements helpful in the design of innovative educational interventions. Developmental psychology and learning theories have been combined throughout this text to explore the interplay between nature and nurture and how it shapes people's worldviews, as a qualitative way of identifying these crucial elements. Reviewing significant experiences forming, evolving and transforming worldviews allowed the identification of these crucial elements potentially useful in an *educere* approach to learning design, as outlined below.

About the individual:

- Participants mostly referred to the psychological influences of other people's worldviews (the social context or nature), and an almost imperceptibly to their intrinsic ability to learn (nurture). This imbalance represents in itself the main educational opportunity from an *educere* approach. It represents the possibility to further explore the encouragement of self-recognition as learners, the self-recognition of multiple inner capacities and an unlimited potential residing within the self. This empirical result alludes to people's endless chances to choose how to signify the individual reality and the collective existence.
- People can be psychologically influenced, but they are not always are aware of it. Significant learning was represented as a retrospective activity, in which participants reflected on their personal stories and selected the significant learning moments; however, they did not always specify whether they were aware at the time of how their own learning process were being influenced. Encouraging increased mindfulness of the present, and awareness about the influences and their impact on an individual's own learning processes, can be considered as another opportunity in the

educere approach to education, allowing increasing mindfulness as people mature.

- Participants shared a diversity of experiences occurring throughout life, exposing the dynamic nature of a worldview. While a child is dependent on others for care, and learning is their major activity in life, adults learn constantly – even when becoming more independent and having other roles and responsibilities. Children are beginning to experience life, whereas '*the resource of highest value in adult learning*' is the accumulation of experiences – experiences of different kinds, which are already interpreted and organised (Merriam 2013, p. 14) into meaning systems and worldviews. People continue to learn throughout their lifespan (Aspin 2000; Hoggan 2017; Laal 2014; Merriam 2013), and this is another reason to encourage self-recognition, as permanent learning beings always exposed to multiple sources and forms of influence.

About the context:

- The influence of social relationships and the permanent interaction with other people's worldviews represent another learning opportunity. As important as the curricular content (an example from *educare*) is, the self-recognition of people as potential influencers might be equally (or more) important. The ways in which people talk, behave and are always have an impact on other people –unconsciously, consciously or meta-consciously, those other people will allow such influence to impact on them. However, regardless of the level of awareness of the other influenced person, self-recognition as a potential influencer may also prompt changes in the ways people talk, behave and are.
- Significant learning was not reported as a result achieved in the formal educational settings. No participants in this study reported the formal educational settings (curricular content, intellectual challenges, disposition

of classroom etc.) as triggering significant events in the formation, evolution or transformation of their worldviews.

At its core, the *educere* approach to education involves a gradual process of self-exploration of inner capacities and the self-recognition of one's own potential. In this context, an inference of this empirical exploration might be the relevance of self-recognition as a crucial element for innovative learning design, as well as the potential of a worldviews approach to achieve such a task. As mentioned throughout the chapter, mindfulness emerged as a possible vehicle to achieve self-recognition of one's own worldview.

Mindfulness (and contemplation) in education is an incipient area of research (Bright 2013; Ergas 2013; Morgan 2012; Morgan 2013b; Siegel 2017b; Tan 2014); however, an important author consistently referred to in this study is making significant contributions in this regard. Constantly enriching his Experiential Learning Theory, Kolb (2009) has recently discussed how learners create learning habits to make sense of the world and, gradually, automatize and over-routinize such habits, missing opportunities to explore their own potential. He recognises that mindfulness is an age-old practice used to overcome the tendency to repetitively automatize emotions, thoughts and actions through life, and to explore the unlimited human potential. In alignment with recent empirical studies, Kolb argues that practising mindfulness enhances mental and physical health, creativity and contextual learning. Living mindlessly can result in a host of problems including, but not limited to, the difficulty of navigating and changing unlimited forms of being in the world (Ergas 2013; Kolb 2009).

All the inherent educational implications from these learning insights are discussed further in the next chapter, *A Worldviews Based Learning Framework (WBLF).*

6.6 Summary of chapter

In this study, all the reported experiences are considered to be significant in terms of learning because participants subjectively identified them as moments in which their worldview was influenced and shaped. They were moments in which they built a valuable piece of meaning which affected them either by an expansion of skills, sense of self, or life perspective or by precipitating a change or transformation in their meanings involving the person as a whole.

Developmental psychology and learning theories helped to identify and connect how life experiences shape worldviews. The psychological influences identified in the participants' narratives were observation, direct interaction, identification, transmission, modelling, internalisation and integration, which were linked to Social Learning, Experiential Learning and Transformative Learning. Through the analysis of the reported experiences it was possible to identify a connection between what participants identified as the most significant life experiences that formed, evolved and transformed their own personal worldviews, the sources of psychological influence and type of influence they embedded, and what they learned from such experiences.

The interpretative frame for data analysis guided the identification of crucial elements potentially useful in the *educere* approach to education and learning design. These elements can be condensed into self-recognition of own worldview, and mindfulness of learner and potential influencer identities (Kolb 2009) as representative areas of opportunity. Learning fluctuates between the most automatic and uncritical ways, to meta-conscious forms in which people critically assess meanings before integrating or re-integrating them into their own worldview. This premise allows the identification of self-recognition as learners and influencers, as well as the practice of mindfulness in the achievement of such self-recognition, as fundamental components in the *educere* approach.

CHAPTER SEVEN: A Worldviews Based Learning Framework (WBLF)

'Those who cannot change their minds cannot change anything'

Bernard Shaw

This chapter amalgamates the main premises discussed throughout this thesis. The literature review presented in Chapter 2 made evident significant research opportunities related to the purpose of this doctoral investigation. They were captured into four research questions, two of which were explored theoretically and answered by the integration of the Transdisciplinary Framework on Worldviews and Behaviours (TFWB) in Chapter 3. The TFWB and the remaining two research questions together informed the qualitative strategy presented in Chapter 4. Chapters 5 and 6 analysed and interpreted data using elements from a diverse range of concepts, providing answers for the two empirical research questions. This chapter fuses the theoretical (Chapter 3) and empirical (Chapters 5 and 6) findings into a unified outcome: a Worldviews Based Learning Framework (WBLF).

The proposed WBLF includes five learning principles encompassing and representing the main premises built throughout this thesis. Although learning is one of the three sub-processes constituting the master mental process of embodied cognition, as explained in sections *2.2.1 The processes of the mind: intelligence, learning and memory* and *3.2.2 Layer 2: the embodied mind and its worldview*, the qualitative dimension of this study focused on self-recognition, reflection and learning rather than quantitatively testing intelligence or memory. The three sub-processes (learning, intelligence and memory) are interdependent and inseparable, but it is the meaning-making sub-process (learning) that is highlighted throughout the chapter as the integrative force. Indeed, learning and worldviews are closely related, an interconnection reflected in each of the five principles integrating this framework.

After introducing the WBLF, the chapter then discusses the five principles with a more detailed argumentation linking each principle to findings from this research. Then, the chapter shows the potential application of this learning framework, based on one example of a learning experience that was designed and delivered with the aim of encouraging introspection and reflection about people's individual and collective realities. This example shows how it could be possible to apply this learning framework to help unpack and reframe the deeply ingrained current unsustainable tendencies, as sought by the transformative goals and agenda of Education for Sustainable Development (ESD).

7.1 Introduction

The WBLF discussed in this chapter responds to the initial motivation of this doctoral journey. It encompasses and represents the crucial areas of opportunity identified throughout this investigation, where the *educere* approach to education can be further developed and reunited with *educare*. As argued in section *2.1 Two disjointed educational paradigms: educare and educere*, the need to reconcile *educare* and *educere* was identified as a fundamental task in the achievement of the ESD transformational goals. Such reconciliation or reunion can allow a deeper transformation of the self and the meaning of the human existence. Based on theoretical and empirical findings, this research suggests that self-recognising one's own, and other people's, worldviews (for example, through meta-consciousness and/or mindfulness) presents basic learning opportunities for the development of the *educere* approach. Thus, ESD could benefit from new learning principles, based on positioning worldviews at the heart of its practice and research.

In this study, the term *worldview* constituted the optimal concept to represent the wholeness of the mental and behavioural complexity of humanness. It has helped to quantitatively explore and self-explore how people apprehend and make sense of their own reality, form their unique structures of meaning, and live through them. Thus defined, a worldview is the foundation of people's identity, explaining their reality and

prescribing their patterns of emotions, thoughts and behaviours (Hand 2012; Johnson 2011). Questioning the meaning of the human experience and exploring new ways of being, becoming and behaving, as transformative ESD aims to do, may commence with the self-recognition of one's own personal worldviews. For most people, just recognising the deepest meanings from which they operate, in full awareness that these meanings may not be serving their deepest intentions or may not be aligned with or expressed by current behaviours, '*is enough to make a powerful shift*' (Hedlund-de Witt 2016).

Learning, in turn, is conceived in this study as the combination of physical, mental, individual and social processes occurring simultaneously and converging in each life experience (Jarvis 2005; Siegel 2001, 2012). *Learning* is considered as the mental process where the mind (personal worldview) enters an environmental (mostly social) situation and mirrors such an experience (Jarvis 2005). This mental mirroring is then transformed through affective, cognitive and behavioural processes, and its ultimate meaning is integrated into the person's biography (personal narrative) as the driving force behind the continuity of being, becoming and behaving. In this WBLF, human learning is conceived as the main vehicle behind the formation, evolution, transformation and expression of worldviews.

The learning framework presented in this chapter implies conceiving a worldview as the enclosure of human potential (multiple potential ways of being), and learning as the mechanism forming, transforming and expressing such potential. This WBLF implies using the self-recognition of worldviews as a tool, as a lens for understanding one's own, and other people's, multiple responses to themselves, others and the world. Such an approach could promote a better comprehension of how meanings are formed, transformed and acted out, implicitly allowing a better understanding of what shapes patterns of emotions, thoughts and actions people live through. A WBLF like the one suggested in this dissertation could facilitate the self-recognition of how

people sense and apprehend the world, and how they build the meanings that constantly shape their ways of being, becoming and behaving.

This WBLF encourages the comparison between what someone thinks her/his worldview is, and what nascent research tools (like the questionnaire used in this research) could suggest, or what other people may perceive from the outside about her/his worldview (Wilson 2004). These forms of comparison enable the emergence of possible contradictions by challenging ingrained and inadvertently uncritical meanings. In this study, comparing the self-nominated and the survey-assessed types of worldviews revealed that sometimes what or who people think they are differs from what external sources capture and suggest. This could be challenging, but emotional responses would prompt critical self-reflection, resembling the first step in a transformative learning experience. It is important to emphasise that people experiencing these types of challenges may require an emotional support system and proper follow-up (Cheney 2010).

Through a worldview lens, inherent opportunities for change and transformation may become visible. Based on the transformative goals of ESD discussed in section *1.1 The enquiry space: new challenges and opportunities in the field of Education for Sustainable Development (ESD)*, and the Experiential, Social and Transformative Learning theories, the volatile mental capacity to critically self-reflect is the crucial element allowing or constraining the exploration and creation of new meanings. Methods aiming to increase sustained consciousness and focused attention would encourage appropriate conditions for critical self-reflection and, with this, facilitate the discovery of the depths of a worldview. Methods prompting critical self-reflection about a person's own perceptions and behaviours, and the alignment between the two, will foster the investigation of the meanings shaping the way people are, implicitly encouraging the imagination and creation of alternative ways of being (Kolb 2009; MacKinnon 2013). Thus, a worldviews approach to learning would encourage critical self-reflection about participants' own personal worldview and potentially

initiate the third phase of a transformative learning experience.

Critical self-reflection about perceptions and behaviours of a personal worldview can also evoke curiosity to compare one's own worldview with other types of worldviews, uncovering endless possibilities and unlimited potential for the creation of new ways of being, resembling phases 4 and 5 of a transformative experience.

Learning how worldviews are formed and expressed holds distinct benefits. Learning about its formation is equivalent to reflecting on how information is processed to build unique arrangements of meaning, with the inherent opportunity to explore and create new forms of significance and new conceptualisations that generate possibilities for more sustainable ways of being. Learning how a worldview is expressed is equivalent to reflecting on mental states, attitudes, choices and behaviours, which are the mental layers through which a worldview unfolds (as explained by the TFWB). This could open possibilities to explore how to be fully aware of the dominant emotions and thoughts provoked by a given experience that facilitates a switch between mental states and leads to the exploration of new attitudes which then translate into different behavioural choices (Hasenkamp 2012; Kolb 2009; Schooler 2015). Learning how the body builds the mind, how the mind builds meaning, and how meaning is expressed could provide increasing opportunities to build and express different ways of being, becoming and behaving.

The following five sections correspond to each of the five learning principles comprising the WBLF. Together, these represent the ultimate outcome of this doctoral research project.

7.2 Principle 1. Learning is not cerebral but embodied: the whole body forms, changes, transforms and expresses meaning, not only the brain

This first principle encompasses the anatomical and physiological aspects of learning, referred to hereafter as *organic learning*. This feature of learning was discussed through theories of embodied cognition in sections *2.2.1 The processes of the mind: intelligence, learning and memory*, and *3.2.1 Layer 1: the nervous system in the body*. Throughout chapters 2 and 3 it was highlighted that it is the entire neural structure that makes learning possible; it is the whole nervous system working in unison, encompassing and extending beyond the brain. Learning is an embodied capacity.

Human beings are complex biological organisms constantly interacting with the internal and external environments because of all the neural components working simultaneously (Maturana 1998). This research takes the view that the brain and the body are inherently joined elements not able to exist separately (Lancaster 2013). As explained in Chapter 3, rather than any of its isolated parts, it is this whole neural complex of brain and spinal cord, in the central nervous system, and the nerves spread across the body in the peripheral nervous system, that makes it possible to compute all the data gathered from our inner and outer environments (Northoff 2006; Siegel 2001, 2012). It is the integrated work done by all the neural components spread across the entire organism that gives rise to the mind – the embodied platform where the worldview is formed, changed and transformed, and from where its configuration in time (or mental state) determine attitudes, decisions and specific behaviours.

This systemic approach to the nervous system, embodied cognition and learning, represents an opportunity to stimulate the entire body with all the multiple senses embedded (Malone 2008); for example, learning design could include the five most commonly recognised senses as well as proprioception (movement), equilibrioception (balance), mechanoreception (vibrations), thermoception (temperature) and chronoception (the passage of time) (Friedman 2005), instead of focusing on just the

logical thinking cerebral facet of learning. Further, learning design based on an *educere* approach to education could also guide the learner into the self-recognition of her/his worldview and identity as a learner (and potential influencer), and show her/him how different stimuli from internal and external environments constantly influence and shape her/his learning process and worldview.

7.3 Principle 2. Emotions are the central energy activating the body, learning, the mind and its worldview: recognition and management of emotions is thus a fundamental aspect of learning

This second principle emphasises that learning is largely dependent on emotions. As discussed theoretically in sections *2.2.1 The processes of the mind: intelligence, learning and memory* and *3.2.1 Layer 1: the nervous system in the body*, and empirically implied in sections *5.1 Experiencing the initial self-recognition of a personal worldview as a whole entity, 5.2.2 Critical self-reflection about the overall experience of being asked to self-recognise a personal worldview,* and *6.5 The interconnection between life experiences and the nature of worldviews,* emotions are sets of sensations representing bodily awareness, which constitutes the central energy activating the embodied mind and the dynamism of a worldview. From these sections, we recall that the behavioural shortcut, or fast process, where emotions lead to actions and vice versa, with or without the intervention of memory systems and without the thinking facet, are the majority; thus, it is argued that emotions operate mostly unconsciously. However, it is possible to become increasingly conscious, and even mindful and meta-conscious, about one's own and others' emotions. This individual mental capacity to self-recognise and communicate an emotion, as well as to identify and feel someone else's emotions, is termed *empathy* in the discussion that follows.

In this principle, empathy is not a component of emotional intelligence but rather a synonym for emotional intelligence. It encompasses both one's own and others' emotions as equally important. The emotional management within and among

individuals encompasses the recognition and verbal/non-verbal communication of one's own emotions, as well as the receptiveness and ability to sense someone else's emotions (Preston 2002). Although colloquial definitions of empathy have been usually focused on the latter – sensing other people's emotions – just as another component of one's own emotional management or intelligence (Goleman 2011), this text considers that such definitions are incomplete. As research on empathy shows, a person cannot sense another's emotions if she/he is not able to first recognise and communicate her/his own emotions (Carr 2003; Davis 1983; Decety 2014; Eisenberg 1987; Klimecki 2014; Krznaric 2014; Preston 2002; Stueber 2017).

This text considers empathy as the flow of energy and meaning among people's minds and their worldviews, which occurs through the self-recognition and communication of one's own emotions, and recognition of other people's emotions. The verbal and non-verbal communication of emotions constitutes the primary means by which intra- and interpersonal experiences shape the ability to learn, and the possibilities for the worldview to integrate such experiences and allow meaning to emerge (Almada 2013; Haidt 2003; Ortony 1994; Siegel 2012; Taylor 1996).

Emotions serve as a central organising process within the mind, directly shaping its ability to integrate experience and to adapt to future stimuli (Siegel 2012). Clear examples of this are discussed in section *6.2.2 Interacting with other people's worldviews within the school context*, where the emotions observed and shared among children in the social school context had a strong impact on the participants' significant learning and the shape of their worldview.

Emotions constitute the sensorial trigger prompting the nervous system to continuously create, compare and blend mental schemas until meaning is built (Siegel 2001), as represented throughout the TFWB in Chapter 3. Studies on embodied cognition, as well as emerging research on the unconscious mind, support the conception of emotions as '*the fundamental aspect of mental life*' (Siegel 2001);

therefore, an increase in the conscious and meta-conscious capacity to empathise could:

> *…create a deep sense of meaning and connection within oneself and with others… an integrative process… proposed to be at the core of emotional well-being… psychological resilience… fundamental to the evolving mechanisms within the life of an individual, dyad, family or community's continual movement toward mental health (Siegel 2001)*

The human experience is first and foremost intersubjective, as discussed throughout Chapter 6. It is impossible to separate reasoning from emotion, just as it is impossible to separate the individual from the social (Hoggan 2017; Lerner 2015). Affection and reasoning, or cognition, influence one another in ways that are not likely to be unidirectional or simple (Lerner 2015). According to Hoffman (2010), for instance:

> *…affect may initiate, terminate, accelerate, or disrupt information-processing; it may determine which sector of the environment is processed and which processing modes operate; it may organize recall and influence category accessibility; it may contribute to the formation of emotionally charged schemata and categories; it may provide input for social cognition; and it may influence decision making (Hoffman 2010, p. 246)*

Intelligence and learning are not primordially rationally driven; they rely significantly on the exploration and resolution of feelings, which are the emotions of the individual as interpreted by her/him (Taylor 1997a, 1998).

Learning how to become more conscious of the emotions felt by the self and others, and how they shape the formation and expression of meaning through choices of behaviour, are opportunities for learning design. From an *educere* approach to education, learning how to self-recognise, communicate, recognise in others, and manage emotions involves an increasing bodily awareness that constitute the

groundings of the mental architecture, as the TFWB in Chapter 3 explains. Learning on empathy is thus a fundamental aspect of being.

7.4 Principle 3. The intricate combination of one's biology and social relationships is what makes worldviews unique: one's own and others' learning processes and meanings are both unique and interdependent

The third principle in this framework honours the uniqueness of a single worldview, based on its fundamental interdependence with other unique worldviews. The uniqueness of a worldview was observed first in a theoretical form, while integrating sections *2.2.2 The contents of the mind: schemas, interpretations and perceptions* and *3.2.2 Layer 2: The embodied mind and its worldview*. It was also later observed in chapters 5 and 6, through the analysis of the subjective singularity in each participant's narrative.

Particular forms of interaction between genetic expression and life experiences make learning, and the resulting hierarchical network of meaning or worldview, unique. The TFWB built in Chapter 3 is a model created to explain the bidirectional flow between genetic influences (layer 1) and behaviour (layer 5). While learning is a shared mental process among individuals, differentiated life experiences shape differentiated patterns of neural connections and vice versa, forming unique minds with unique worldviews – which, in turn, prescribes unique patterns of emotion, thought and action for subsequent experiences. The discussion in Chapter 6 made evident that nature and nurture do not work separately; they constitute an inherent entanglement that cannot be dissected or split (Crews 2014) in any of the reported experiences.

The embodied mind is conceived as an open system in permanent interaction of flows of energy with the internal and external environments (Maturana 1998; Siegel 2001, 2012). As shown in chapters 2, 3 and 6, the dyad nature/nurture converges in the mental dimension of the person, where the most heritable features are not genetic but

culture-dependent (Kan 2013), like those family-influenced characteristics discussed in Chapter 6. While nature refers to the manifestations of one's own biological structures and processes in human development, nurture refers to sociocultural influences. Limitless possibilities for interaction between nature and nurture make learning unique in each and every person.

Among one's own biology and intrinsic characteristics or personality traits (related to organic learning and empathy as individual features), this principle recognises the integrative tendency of the mind when building meaning (Rowley 2007; Siegel 2012). As discussed in chapters 2 and 3, models of wisdom, cognitive development and epistemic understanding, or embodied cognition, to mention some examples, explicitly refer to this mental tendency (Kallio 2011). The uniqueness of learning results from the particular arrangements of meaning produced by constantly mapping and blending all the mental entities each person makes, interweaving the significance into a unique worldview (Augsburg 2013).

While this principle recognises the individual features mentioned above, it also encompasses the vital relational aspects of learning, observed throughout Chapter 6. The interaction with other people's own biology and intrinsic characteristics or personality traits is what makes a worldview unique.

Genetic constitution predisposes, while events experienced throughout development shape (Crews 2014), and together both phenomena provide the individual with the chance to build and integrate unique meanings to her/his reality, creating a unique worldview. The multiple and permanent influences between genes and environment create infinite possibilities to form and integrate meanings in a unique worldview. The worldview is formed, changed, transformed and expressed by the individual, at the interface between human interactions, through relationships. As discussed in chapters 2 and 3, the perennially dynamic configuration and expression of the worldview is influenced by '*the relational process that regulates the flow of energy and*

information' among people (Siegel 2012, p. 26). In particular, Chapter 6 showed how the social context, within the family nucleus, around the family nucleus and at school, is the main influence in the formation, change and transformation of someone's own worldview.

The neural system and its worldview (own biology/nature), and the relationships among people (social context of life experiences/nurture), are the two pillars of human reality (Siegel 2017a; Siegel 2017b). Individual selves are interdependent – specifically, through the constant exchange of energy and meaning (Siegel 2012), where meaning consists of energy with symbolic significance: stimuli mirrored into meaningless schemas, mapped and blended until meaning emerges, as discussed in Chapter 3. For example, someone's voice stimulates air molecules as kinetic energy; then the senses respond to this energy flow through bodily sensations or emotions, creating electrochemical energy movements within the acoustic nerve and downstream neural circuits of the brain. Then, ions flow in and out of the neural membranes, and the release of chemical transmitters activates downstream neural connections. When these patterns of neural firing match with prior meaning built in the worldview, then this energy flow has informational value and the listener can understand what the speaker has said (Siegel 2001). The nervous system is the embodied neural mechanism shaping the flow of energy and meaning; relationships share and exchange the flows; and the embodied mind (a relational interface) and its worldview (the meaning constellation) regulate the flows (Siegel 2001, 2012). In short, one's own meaning-making depends on the meaning-making of other minds (Siegel 2001, 2012).

From an *educere* approach to an educational perspective, it could be argued that referencing standardisations (e.g. ideology, discipline of knowledge, curricular content, age groups, tests and activities) may obscure and disenfranchise the experience of the uniqueness of the self, hindering the consequent embrace and acceptance of human diversity (Kolb 1984; Moon 2012; Schlitz 2010). It would be desirable, instead, to emphasise the self-recognition of the individual's unique learning and worldview, and

the potential influences received from nurture. For example, learning about the multiple possibilities of interaction between nature and nurture would prompt a more integrated understanding of the complexity of the human condition and the need to respect all forms of being, becoming and behaving.

7.5 Principle 4. A worldview is mostly an unconscious entity: consciousness and meta-consciousness occur rarely and only for short periods of time

The fourth principle of this learning framework alludes to the permanent possibility of the mind to recognise, change, transform and express unlimited ways of being (human potential) enclosed into a worldview. This principle emerged theoretically in section *2.2.1 The processes of the mind: intelligence, learning and memory*, throughout the integration of the TFWB in Chapter 3, and empirically throughout chapters 5 and 6 (specifically, in sections *5.2 Experiencing a more detailed self-recognition of a personal worldview, its components and expression* and *6.3 Experiences shaping the evolution of a worldview* and *6.4 Experiences shaping the transformation of a worldview*).

This principle implies that, although the meanings built by the mind, contained in a worldview and expressed through behaviours are mostly unconscious, they can be intentionally targeted by meta-consciousness and critical self-reflection. Only an approximate 5% of the mind (Bargh 1999) operates in an attentional continuum between consciousness and meta-consciousness, according to Schooler's tripartite model (Schooler 2004a; Schooler 2015; Smallwood 2015). However, a worldview can be always explicitly self-recognised, assessed, modified or transformed, as a result of personal intention, which increases possibilities to build a more coherent personal narrative, as explained in chapters 5 and 6.

Daily life represents the consciousness state, where people are constantly building and expressing meanings but not necessarily reflecting upon them, their causes or their potential consequences (Schooler 2006; Wilson 1991). At the exceptional level of

meta-consciousness, the reality mirrored in someone's worldview is not only reflected and potentially modified but also transcended. Individuals are only intermittently meta-conscious, realising occasionally that they are not noticing or attending what they are experiencing (Schooler 2015). Schooler argues that learning depends on the extent to which the predominant mental state is inclined towards *'focused attention*' or towards '*mind-wandering'*, as the opposing ends of the attentional continuum between consciousness and meta-consciousness (Schooler 2017, p. 503). In other words, one extreme of the attentional continuum involves consciousness and mind-wandering; whereas, practising mindfulness and focused attention can bring the mind into the other end of the continuum, meta-consciousness.

Chapters 5 and 6 showed how participants navigated through this attentional continuum. Their voices were permanently, and often involuntarily, shifting among descriptions, verb tenses, feelings, ideas and memories, due to the simultaneous recollection of a variety of experiences and their significance (Brushwood 2013). In addition, Chapter 6 exposed how, although a multitude of unconscious and conscious processes influence an individual's behaviours, periodically, he/she will need to explicitly attempt to execute his/her meta-consciousness, creating the opportunity to step out of the situation or experience and explore further possible new meanings (Schooler 2011, 2015). Both chapters showed how meta-consciousness and critical self-reflection can prompt the exploration and choice of the many alternative forms of meanings and behaviours that individuals are capable of (Brushwood 2013; Schooler 2015). Minimising the dissociation between meanings detected but not necessarily reflected upon, and meanings explicitly noted and also reflected upon, has the potential to reveal opportunities to build more coherent personal narratives.

From an educational perspective, encouraging mindfulness can prompt increasing opportunities for meta-conscious reflection which, in turn, provides opportunities to better understand the processes through which emotions, thoughts and actions are generated. In the long run, this may allow an individual to set appropriate strategies

for regulating these patterns in order to maximise the benefits and minimise the costs of any given experience (Schooler 2006). Thus, this fourth principle implicitly recognises a liberating aspect of becoming meta-conscious about one's own worldview. It implies that, at any time, uncritically internalised or unsatisfactory integrated meanings (biases) that have been observed, transmitted or imposed by the status quo (i.e. through paradigms), can be critically detected, reflected and changed.

In an *educere* approach to learning design, this principle represents the opportunity for mindfulness and meta-consciousness, where gaining awareness increases coherence of personal and collective narratives. Becoming more mindful about the opportunity to practise and reach meta-consciousness at any time could facilitate the recognition of unsatisfactory meanings built and given to the self, others and the world. Becoming more aware of the underlying meanings given to reality is what actually increases opportunities for a more sustainable existence.

A meta-conscious level of learning equates to opportunities to delve into one's own worldview and, with this, explore the potential to create different patterns of emotions, thoughts and actions. Once a person has intentionally focused and critically reflected on certain meanings about any given experience, he/she then has the inherent opportunity to just acknowledge them, partially change them, or deeply transform such meanings into multiple alternatives (Mezirow 1990; Wilson 2002b, 2004). Through the '*amplification of one's subjective experience, increased self-knowledge, self-regulation, and inferences about others' mental states*' (Morin 2011, p. 807), meta-consciousness always brings the opportunity to free the mind from imposed uncritical meanings. Intentionally reflecting, creating and choosing new meanings allows the comparison between any given real self-aspect to an ideal representation of it (Morin 2011).

7.6 Principle 5. Learning is permanent and goes beyond childhood: throughout the lifespan a worldview is constantly prescribing responses to each experience and, in turn, being shaped by the experience

The fifth principle in this framework based on worldviews considers learning as an innate characteristic. As discussed in Chapter 6, learning is an inescapable lifelong feature, a continuous and perennially embodied capacity that occurs not only in childhood, at school or during specific life experiences but as long as the organism is alive.

The organic feature of learning explained above in section *7.2 Principle 1. Learning is not cerebral but embodied: the whole body makes meaning and expresses it, not only the brain* also relates to the passing of time. While gathering, computing and making sense of the information received from internal and external stimuli has variations depending on the developmental stage of the person (Troen 2003; Westendorp 2007), these are permanent mental capacities that operate as long as the organism is physically able, and as long as the nervous system is capable of processing information and making sense of it (Bolhuis 2003; Laal 2014; Schlitz 2010, 2011). In other words, growing up and ageing imply variations in mental capacities like intelligence, memory and learning (reducing intensity as experiences accumulate); however, the constant is that, from the formation of the embryonic neural tube to death, the nervous system constantly processes and makes sense of living experiences. Being in the world implies existence in time, '*being is always in the process of becoming*' (Jarvis 2005, p. 9). Once it has begun to form, an individual's worldview constantly evolves due to that individual's learning, whether or not it is significant – learning is a lifelong feature, permanent and organic, as it occurs as long as the organism is alive (Schlitz 2011).

From an *educer*e approach to education, this principle represents the opportunity to encourage learning activities throughout the lifespan – learning to know oneself, others and the environment, and learning that it is always possible to change patterns

of experiences of, and responses to, reality. This principle encompasses educational orientation for people of all ages facing, for example, one of those moments when disorienting dilemmas trigger doubts on possible ways of being.

7.7 Potential applications of the WBLF

This section provides some basic insights on how the WBLF could shape the design and implementation of innovative learning experiences, encouraging introspection and reflection about people's individual and collective realities. In order to provide concrete and complete examples of learning design resulting in clearly defined activities or practices, a specific context would be required, including the learning objectives or intention, training needs, age or background, location settings, time and resources available, among other features not defined in this instance. The alternative option that is to create a fictitious group in an imaginary context would limit or constraint the potential of each principle in the WBLF, mainly because each principle could be applied with different levels of depth, depending on the characteristics previously listed; particularly, age and psychological development stage. Nevertheless, this section combined some of these features into five different examples, attempting to delve into some more detail of how the WBLF could be applied, providing an approximation of how the resulting learning activities might look like. After the five examples, a final reflection is presented, simulating a lesson-planning template. Five aspects to notice beforehand are:

a) this section is written in first person (italicized text), reflecting on personal expertise as an ESD practitioner
b) this exercise of learning design subtly implies the deep transformation of educational systems, facilities and practices
c) some of the experiential examples provided here allude to the interlinkage of two or more principles simultaneously
d) some of these examples include different levels of depth of the principle in

turn, depending on the characteristics of the participants; particularly, age and psychological development stage

e) all examples are related to the transformative goals of ESD (aiming to psychological changes in deeply ingrained meanings rather than behaviours); however, some of them also relate to the traditional views of ESD as a starting point for reflection: referring to the external environment and sustainability issues, like food production or waste management.

This research provides an integrated explanation about how people apprehend and make sense of their own reality, by forming unique structures of meaning leading to a wide range of possible forms of being, becoming and behaving. Having this explanation makes it possible to reframe ESD's fundamental goals, recognising that the ultimate transformation of unsustainable ways of being is inherently dependent on the previous transformation of the unsustainable depths of a worldview (choices, attitudes, mental states and perceptions, and meanings). Although the inaccessibility of the mind (even to oneself) makes this a challenging task for the ESD community, some key points or propositions, derived from the five learning principles discussed in this chapter, could provide some innovative guidance, as discussed next.

Considering ***Principle 1 (learning is not cerebral but embodied: the whole body forms, changes, transforms and expresses meaning, not only the brain)*** *I would design activities to encourage the stimulation of multiple senses and, most importantly, an individual and collective reflection of what sensations or emotions (feelings) and/or maybe some thoughts (ideas) too, have been prompted by such stimulation. The main goal would be to help participants to gain self-awareness about how the body perceives stimuli and responds to them.*

<u>Example 1:</u> In a group of young children I would spend some time playing with balloons of different sizes and colours, then I would ask them to stand up and close their eyes. I would then guide a 5-minutes breathing exercise (meditation) asking them to picture

their favourite balloon above their head, I would ask them to take a deep breath, hold, and exhale while moving their arms up towards the balloon to help the air reach the balloon through their arms, hands and fingers, and fill it up. After repeating the exercise a few times, I would tell them I'll touch their belly to, metaphorically, pop the balloon (and have some laughs). Then I would ask them to sit down, and I would distribute a white sheet with the silhouette of a human body; I would ask them to use different colours to draw (represent) what they noticed in their body during the breathing exercise.

This learning experience could also be more targeted to represent ***Principle 2 (emotions are the central energy activating the body, learning, the mind and its worldview: recognition and management of emotions is thus a fundamental aspect of learning)****, if the drawings would be followed by a simple reflection on emotions. An option could be to ask them to describe what they draw (felt) and collectively find the appropriate name for the reported sensations and emotions.*

Example 2: In a more complex learning activity with young children I would work with food in the garden, as cooking a simple meal (like a fruit salad) could stimulate taste, smell, touch, sight, hearing, movement, passing of time, equilibrium and balance, and also interconnectedness with the land. Depending on the age and psychological maturation of the group I would encourage noticing sensations and feelings (like hunger, joy, dislike or aversion) and/or ideas (a belief or a family anecdote). A collective conversation, built on previous drawings or selection of pictures or a couple of written words (depending on their age) could prompt an increment of individual and collective awareness of how certain stimuli are individually associated to the resulting sensations, feelings and/or ideas, in each child.

The conversation above could also make evident the similarities and differences among their responses, relating then to the uniqueness and interconnectedness of the minds discussed in ***Principle 3 (the intricate combination of one's biology and social***

relationships is what makes worldviews unique: one's own and other's learning processes and meanings are both unique and interdependent)*. Some participants would observe children feeling or thinking similarly to them, while others could observe children differing. This exercise could lead to find and practice the connections among the similar, with acceptance and embracement of the different, which could be captured by collectively drawing a mural, or me (the facilitator) writing a poem/song, with contributions from the children.*

Even further, the self-recognition of one's own perceptions and the increment of meta-consciousness or critical self-reflection as explained in ***Principle 4 (a worldview is mostly an unconscious entity: consciousness and meta-consciousness occur rarely and only for short periods of time)****, could also be prompted. Regarding more traditional views of ESD, but depending on the age of the children, the conversation above could also prompt the self-recognition of their own perceptions of the land (or nutrition and health, or waste production and management, to mention more thematic examples), and the actions they (and/or their families and/or friends) perform on daily basis to nourish the land as the main source of food (or their bodies and health as the recipients of nutriments, or to increase/minimise waste production). The individual and collective reflections could also be captured by drawing or writing, using this product as a recurrent learning tool to constantly promote permanent self-reflection on the construction of their own personal narratives.*

<u>Example 3:</u> In a learning session with adolescents or adults, the aim of the session could expand and not solely focus on increasing awareness of which stimuli triggers what responses (Principle 1) as explained in examples 1 and 2. With children the basic aim would be to encourage self-recognition of responses to stimuli, but with teenagers and adults it could also be explored what to do with such responses. If the central topic was related to more traditional views on ESD, like waste management, I would take the group into different settings, like a recycling centre, a landfill site and/or a polluted landscape. This could also be done through the combination of in situ activities,

including a visit to the nearest garbage room, with pictures, videos, live streaming from remote places, and real waste samples. When permitted and accepted by participants, this experience could stimulate smell, touch, sight, hearing, movement, passing of time, equilibrium and balance, and maybe even taste. I would encourage interacting with waste and imagining the stories behind each piece (where does it come from, who used it, with what purpose, where and when was it built, what is it made of) noticing sensations and feelings (like curiosity, indifference, disgust or shame) and/or ideas (a judgment value, a belief or an anecdote).

Beyond ***Principle*** *1 and in accordance to* ***Principle 2 (emotions are the central energy activating the body, learning, the mind and its worldview: recognition and management of emotions is thus a fundamental aspect of learning)****, I would guide a 10-minutes body scan to identify the dominant sensations and emotions prompted by the stimuli above, and immediately after I would ask participants to grab their scrapbook with blank pages and express those emotions (without much thinking) through writing a few words, drawing, sticking clippings, pictures, etc. After exchanging initial reflections in pairs on what emotions and ideas have been triggered, a collective conversation could then prompt an increment of individual and collective awareness of how certain stimuli are individually associated with the resulting sensations, feelings and/or ideas, in each person.*

As explained in Example 2, the conversation could be taken to another level depending on the context (age, role in family or society, sensible topics), evoking uniqueness, and interconnectedness with the similar and the different, as explained by ***Principle 3 (the intricate combination of one's biology and social relationships is what makes worldviews unique: one's own and other's learning processes and meanings are both unique and interdependent.*** *Comparing different possible realities regarding the production and management of waste, would be an option.*

This example also provides an opportunity for ***Principle 4 (a worldview is mostly an unconscious entity: consciousness and meta-consciousness occur rarely and only for short periods of time)****. I would ask participants to walk across the room/garden and find someone who reported a different feeling or idea and have a chat trying to track back in time the origin of such feeling or idea (when did the person feel or think that for the first time in their lives). I could provide some strategic questions to shape the focus of attention during the conversations. This activity could also be done individually in the scrapbook in case of the emergence of highly challenging or uncomfortable emotions and/or thoughts. This activity would be guided in order to unveil some ingrained paradigms, like the moment in life when each participant accepted other's explanations, or built their own conceptualizations on human evolution and development, progress, success and even happiness, for example, and how these perceptions relate to the emotions and ideas triggered by exploring waste. At this point, maybe the options of what to do with the emotional and reasoned responses (to the stimuli contained in experiencing different aspects of waste), would unveil. Maybe by now someone has experienced a new aspect about their reality and the creation of a new personal narrative, distinct from the one rooted in the unsustainable paradigms of the modern era, could commence to be developed. At the very least, maybe participants would end up identifying how some stimuli from internal and external environments constantly influence and shape their learning process, the way they sense their reality, and how they have formed some perceptions and responses to such reality.*

In relationship to ***Principle 5 (learning is permanent and goes beyond childhood: throughout the lifespan a worldview is constantly prescribing responses to each experience and, in turn, being shaped by the experience)****, I would encourage the permanent exploration of oneself, others and the environment, and the different possibilities to respond to certain life experiences, as a lifelong opportunity. I would emphasise the (always) available opportunity to change patterns of emotion, thought and action, and the unlimited responses to reality that a person can build over time.*

<u>Example 4:</u> In a group of adult people, I would take a few minutes to present and explain a more didactic version of the TFWB. I would share my own understanding of what the mind and its worldview are, and how they operate unfolding mental states, attitudes, choices and behaviours. After an initial moment of reflection, I would guide a 10-minutes breathing exercise to identify the dominant sensations, emotions and thoughts prompted by the information provided (stimuli). Immediately after I would ask participants to grab their scrapbook with blank pages and express those feelings and ideas through writing a few sentences or just words, drawing, sticking clippings, pictures, etc. After exchanging initial reflections in pairs on what emotions, ideas or questions have been triggered, a collective conversation could then prompt an increment of individual and collective awareness of the dynamic nature of a worldview and the implicit opportunity to always change meanings or the way meanings are expressed. Then I would ask each person to identify some of their own perceptions, regarding, for example, the diversity of human ethnic groups, cultures (what is commonly named race*), and how such perception has evolved over time. I could use some audio-visual resources like the documentary Baraka, and then guide participants to self-recognise their own anthropological perceptions, and how they have evolved throughout their own life experiences (knowing new people, travelling, etc.). Working in teams, participants could then be guided to explore how such consciously noticed perceptions could unfold into different possible mental states, attitudes and behaviours. Playing with imagination and creativity, each group could identify many possible life experiences and forms in which such perceptions could be expressed into specific forms of behaviours, in response to such experiences. At this point, this exercise would be aligned with* ***Principle 3 (the intricate combination of one's biology and social relationships is what makes worldviews unique: one's own and other's learning processes and meanings are both unique and interdependent)*** *and* ***Principle 4 (a worldview is mostly an unconscious entity: consciousness and meta-consciousness occur rarely and only for short periods)****. The collective discussion could explore ingrained racist attitudes, for example, and how to deal with the natural instinct to connect with the similar, and to perceive the different as a threat. However,*

a final collective reflection could emphasise the lifelong aspect of learning, remarking the always available opportunity to change meanings or the ways such meanings are expressed through words and actions, as ***Principle 5*** *implies* ***(learning is permanent and goes beyond childhood: throughout the lifespan a worldview is constantly prescribing responses to each experience and, in turn, being shaped by the experience)****.*

<u>Example 5:</u> In a group of children, adolescents or adults, and after a proper introduction to the learning experience, I would ask them to write or draw a fragment of their personal narratives, related to the topic of discussion, like perceptions of nature and animals, for example. Then, I would ask them to explain their ontological perceptions to someone else; the second person would be asked to explain or role play as if that was their own story, as means of cultivating empathy, and providing a platform where participants could place themselves in someone else's shoes, and explore how it would be to feel, think and live like she/he did. Although this very concrete example could prompt a debate on the relationship between humans and nature/animals, where the individual and collective responsibility to respect the non-human forms of life would be established as one of the key learning goals, this activity mainly represents ***Principle 2 (emotions are the central energy activating the body, learning, the mind and its worldview: recognition and management of emotions is thus a fundamental aspect of learning)****. The development and strengthening of empathy would be the highest learning priority; which, in turn, implies the recognition of different types of perceptions and worldviews as explained by* ***Principle 3 (the intricate combination of one's biology and social relationships is what makes worldviews unique: one's own and other's learning processes and meanings are both unique and interdependent).***

Many more examples can be provided, but in general terms, simulating a lesson planning template, as an ESD practitioner, I would:

- *take the learning experience outside the classroom and into different settings, depending on the theme of the experience: like the park, the factory, a restaurant, a botanical garden, a government office, my house or someone else's house, the community centre, the library, etc. I would always try to show a very different cultural context, through pictures, videos, live streaming from another country, or even traveling when possible. These views are equivalent to the* ***SETTINGS OR CONTEXT*** *section of a traditional lesson-planning template.*
- *use a combination of audio-visual resources and multiple sensory experiences; always combining abstract thinking and critical self-reflection with different positions and scans of the body, sounds, landscapes, and moments of creativity or contemplation. The goal would always be to balance the simulation of the body and the mind; critical thinking and emotional awareness; contemplation and meta-consciousness.* ***RESOURCES AND TECHNIQUES***
- *encourage the permanent practice of self-observation, a sustained process of increasing self-awareness about own emotional responses and how they affect thoughts, decisions and behaviours. In each learning activity, I would encourage the habit to check-in with oneself aiming to be better at self-recognising how own personal worldviews are shaping the ways we are choosing to be in the world.* ***BASIC CURRICULUM 1: MY WORLDVIEW***
- *promote the identification of similar and different worldviews (mental realities) and empathy. In each learning activity I would promote the recognition, interaction and acceptance of different worldviews* ***BASIC CURRICULUM 2: YOUR WORLDVIEW***
- *provide a scrapbook with blank pages and multiple colours for writing, drawing, sticking clippings, or pictures, etc. Maybe some other tools useful in expressing and capturing what is happening in the conscious and meta-conscious mind could also be provided in certain moments; for example, a voice recorder, or taking pictures.* ***(SELF) EVALUATION***
- *emphasise how emotional processes influence cognitive processes and vice versa; inviting people to practice awareness of these interactions in their daily life and, most importantly, how they influence their mental states, choices and behaviours.*

In order to be more attentive or aware of learning processes, meanings and one's own worldview (formation, evolution, transformation and/or expression), people could be encouraged to find unique ways to engage in routines of momentary awareness. I would conclude each learning activity inviting people to observe and explore their own worldview on daily basis, and play with the unlimited possibilities to always shift patterns of emotions, thoughts, actions and, ultimately, ways of being in the world. ***(NON-MEASURABLE) OUTCOMES***

The five principles integrating the WBLF and condensing these doctoral outcomes, have brought together disjointed types of knowledge relevant to the transformative ESD goals, providing a theoretical basis to build learning experiences that encourage introspection and re-conceptualisation of the meaning of being a human. Such learning experiences could, ultimately, contribute to the potential transformation of patterns of emotions, thoughts and actions of individuals, towards more sustainable ways of being, becoming and behaving.

7.8 Summary of chapter

This chapter integrated the theoretical and empirical findings obtained throughout this doctoral research project. Such integration was made through five learning principles with worldviews at their heart. These five learning principles emerged as a possible reference in the design of educational activities where an *educere* approach could be further developed and reconciled with *educare*. Such reconciliation would allow each individual and the collective to recognise and self-recognise the unlimited opportunities of being, becoming and behaving.

These five learning principles integrate a WBLF applicable to any training or educational context. This chapter provided some initial insights of how this framework could guide the design of learning experiences potentially useful in a wide variety of contexts. As observed, the main outcome of this framework is to encourage the self-

recognition of one's own worldviews, with the inherent opportunity to explore, change, transform and create new meanings, which would implicitly result in different patterns of emotion, thought and behaviour. The initial insights provided in this chapter represent innovative ways to design and deliver learning experiences, where people are able to explore, identify, adjust or remake some of the meanings they have given to their own reality. This contribution aims to support the achievement of the transformative agenda of ESD.

CHAPTER EIGHT: Conclusions

'If we could change ourselves, the tendencies in the world would also change'

Mahatma Gandhi

'Our deepest fear is that we are powerful beyond measure…but it is our light, not our darkness, that most frightens us…your playing small does not serve the world…as we are liberated from our own fear, our presence automatically liberates others'

Nelson Mandela

This chapter summarises the main findings and contributions of this research, all related to the dynamic nature of the mental processes and contents; and how the behavioural process origins and unfolds, based on a worldviews approach. This chapter provides a final reflection about the contributions of this doctoral research; it also compiles suggested areas for further research, identified throughout this investigation.

8.1 Key contributions of this doctoral research

The basic motivation guiding this research was to find what shapes the ways people are in the world, beyond knowledge and willingness. The aim was to find innovative educational pathways aiming to encourage a profound reassessment of the modern meanings given to human existence, which consequently modify patterns of emotion, thought and action derived from such meaning. As discussed in section *2.1 Two disjointed educational paradigms: educare and educere,* in order for education to contribute to more sustainable realities, the priority needs to broaden the scope from producing human capital, well-behaved citizens and good workers (represented through the traditional *educare* approach), to also facilitating the exploration, creation and experience of new ways of being in the world (a more inwardly or self-observation approach promoting critical self-exploration represented by the *educere* approach). This research focused on the identification of what shapes people's identity and based

on that, how to create innovative *educere* pathways that could work in unison with the *educare* tendencies, honouring intergenerational information and knowledge but encouraging the creation of new meanings (ontologies).

In this study, the vast literature reviewed not only helped distinguish the two dominant educational paradigms mentioned above, and the need to reconcile them; but also helped identify the term *worldview* as the potentially integrative force. In this investigation, worldviews constituted the optimal concept to represent the processes and contents of the mind and its connection to the human behavioural complexity, in a transdisciplinary form. By integrating disciplinary knowledge in an innovative framework, this research built a more holistic explanation of how people apprehend and make sense of their own reality, form their unique structures of meaning, live through them, and evolve the structures along the way. The resulting TFWB helped to position worldviews as the foundation of an individual's identity, but it not only details an original conceptualisation of a hierarchical network of meaning, but also provides a transdisciplinary explanation of how such meaning prescribes patterns of emotions, thoughts and behaviours.

The TFWB fused several prevalent dichotomies in the literature in order to explain the types of mechanisms giving rise simultaneously to the uniqueness and the wide diversity of human conduct. Based on an onion-like shape, the TFWB explained human potential as unlimited forms of being in the world: from one meaning structure multiple mental states can be created, and from one mental state multiple attitudes emerge, and from one attitude a wide range of behavioural responses can be chosen. Embodied cognition represented the complex but optimal field of research where premises related to the genotype and phenotype studies converged. In addition, the theory of the Interpersonal Biology of the Developing Mind (IBDM) also helped to integrate neural and social connections. The relationship between worldviews and the behavioural process is defined by the former always shaping the latter. The main

contribution emerging from the TFWB is that human behaviour is the physical (embodied) representation of a personal worldview.

Empirically, when people were asked to self-recognise their personal worldview, a level of meta-consciousness with critical self-reflection was prompted, resembling the first five phases of a transformative learning experience. Participants in this study struggled to identify their personal worldview as a whole entity, their components, and/or forms of expression, showing inconsistency and variations in their capacity to self-recognise, critically reflect and eloquently express themselves. Regardless of the causes of the inconsistency occurring at the time of their participation in this study, the responses of the participants illustrate the complexity and difficulty that people face in accessing and making sense of their own personal meanings (perceptions) and how they are expressed in their daily life (behaviours). This inconsistency, complexity and difficulty represent a transformative learning opportunity from an educational perspective.

In addition to the empirical outcome summarised above, the most significant life experiences forming and transforming the participants' worldviews in this study were very diverse; however, the common element reported was the exchange of meaning through social relationships. Social connections in the family and school contexts during childhood were linked with the formation of a worldview. Interactions with different people through adolescence and adulthood were related to the steady evolution of a worldview. The most significant life experiences transforming the participants' worldviews were different experiences sharing a common characteristic: the emotionally challenging loss of, and grief for, old meanings, leading to the renewal or creation of new meanings, involving the whole person. At different ages, these reported experiences showed how the participants' worldviews were challenged, prompting difficult emotions which triggered critical self-reflection and the readjustment of meanings through a psychological integrative process. Exchanging meaning with other people is what the participants reported as the key circumstance

allowing them to question their own reality and themselves, prompting the creation of new meanings, or their subtle change or deep transformation.

The empirical work supported the promising potential of worldviews, already established through the theoretical TFWB. Both findings, made evident that a worldviews approach in the educational context, could be a promising option to reconcile *educare* with *educere*. By working with worldviews, people could develop more insight about the (unsustainable) foundations of the way we have chosen to be in the world, individually and collectively; inherently increasing the opportunity to create unlimited new ways, different from the (unsustainable) tendencies that are compromising our common futures. This potential of a worldviews based approach to education was consolidated through the five learning principles that constitute the WBLF.

The WBLF opens opportunities for innovative learning design and more inventive educational pathways. The basic creative component relies on the recognition of worldviews (*mine and yours*), bringing into conscious attention some of the most ingrained assumptions we all have accumulated in the unconscious mind. This translates into gaining self-awareness about the ways (*me and you*) have chosen to be in the world. The main aspect of relevance in this proposition of working inwardly (*educere*), and balancing out centuries working outwardly (*educare*), is the inherent opportunity to subtly change, or radically transform the meanings we have built over time, about ourselves and the planet. Exploring and adjusting the inside (the mind and its worldview) would be reflected in the patterns of emotion, thought, and behaviour on the outside.

Having a transdisciplinary and integrated explanation of what sits behind people's identity, opens educational opportunities to encourage the exploration, change and transformation of the ways people are, become and behave. This would encourage the self-recognition and the collective recognition of unlimited ways of being. Although the

inaccessibility of the mind makes this a challenging task for the ESD community, this study provides a WBLF with five principles that provide some innovative guidance.

The WBLF produced by this research is an innovative reference for learning design, in which the complexity and uniqueness of the human mind, and the diversity of humankind, is embraced. Also, where the role of self-recognition, one's own construction of subjective meanings and their creative expression, is emphasised. Ultimately, where the freedom to explore the self and the collective, allowing new ways of who and how to be, become and behave in the world, is honoured.

8.2 Recommended areas for further research

This section highlights three aspects that warrant further investigation to strengthen the theoretical and empirical basis of the TFWB and the WBLF. These two contributions are now the subject of more critical review; this section compiles suggested areas for potential investigation, identified throughout this study.

Firstly, there are opportunities for the enhancement and refinement of the TFWB. As discussed throughout chapters 2, 3 and 4, the theoretical and empirical exploration of worldviews is a nascent field of research, and the TFWB is only the third model suggested, in addition to Hedlund-de Witt's (2013) and Devlin's (2010). There are multiple chances to explore further into the literature or to generate empirical data, in order to strength the model. For example, as explained in section *2.2.1 The processes of the mind: intelligence, learning and memory*, theories on embodied cognition are diverse and disjointed; as well as complex and challenging to study. They integrate the visible aspects of the body, with the invisible aspects of the mind; but they can also integrate the visible and invisible through the study of quantum physics. They can also integrate studies of consciousness where it is possible to find references to entities of a new order, different from visible and invisible. In the empirical dimension, this study explored the practical implications of the TFWB with twenty-five people, and the

generation of more data is necessary; for example, the TFWB could inform multiple empirical strategies to further investigate mental states: How can we name them? How can we shift between them? The empirical study in this research represents a solid base to build from: besides an online questionnaire, what other elements can prompt the self-recognition of personal worldviews, or what other mechanisms can help to capture people's responses? What happens among different groups of people?

Secondly, a particular component from the TFWB, reflected also in the empirical work and captured in the second principle of the WBLF, emerged as a high research priority: the role of emotions in mental life. Although section *2.2.1 The processes of the mind: intelligence, learning and memory* indicated the academic consolidation and international development of the affective sciences, some key components – like the role of emotions in the formation and expression of perceptions, are significantly scarce and significantly necessary. For decades, cognitive sciences have produced a vast body of knowledge on mental processes and contents, and embodied cognition is now adding revolutionary conceptions based on the role of emotions; however, contributions on the role of emotions require further strengthening. For example, the neural basis of empathy: why is it so difficult to develop empathy when it was not encouraged in early childhood; how come reading the story of a stranger on the other side of the planet can make someone cry? (Decety 2014). If empathy mediates aggression and strengths mental health, why has the development of empathy not been a research priority?

Thirdly, and most importantly, the TFWB and the WBLF are two educational resources ready to be used in learning design. Another area for further research is the implementation of these two outcomes in practice. Only through their implementation in the practical dimension of ESD (and other fields like counselling, where worldviews have been more widely used with educational intentions, as explained in section *2.3 An overview of the study of worldviews*), areas of improvement could be identified. Applying these frameworks would help to track the experience for both the learner

and the facilitator. The analysis of such experiences would allow the identification of opportunities for improvement. For example, what are the implications of the TFWB and the WBLF in early childhood education, where a worldview is forming rapidly in the unconscious mind? Or how easy/difficult would it be for regular primary and secondary teachers to comprehend both tools and to apply them in their regular practices? Would this be possible? By using these two learning tools, it would be possible to strengthen their bases and potential, improving the potential impact they could have.

In the long term, further research on the theoretical and empirical dimensions of these research outcomes and educational resources, may lead to the consolidation of the groundwork for a transdisciplinary theory of the nature of the human condition. Such a theory might help individuals and societies from present and future generations, to achieve increasingly sustainable ways of being, becoming and behaving.

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Appendices

A. Original questionnaire

This questionnaire explores your attitude towards life in general, and your perspective on nature and the environment in particular.

Sometimes we speak of 'sustainability.' With that, we mean ways of life, production, and consumption that are minimally harmful to human beings and environment—both here and at other places in the world, both now and in the future.

It is also good to know that when the term God is used, we do not necessarily mean the Christian God. The word can also refer to the divine, the ultimate, or the Creator (Brahman, Allah, Yahweh, etc.).

Each time you get to see four statements. These four statements give a different view on the same topic. Please select the item you **most agree with** (or fits you best), **and the one you least agree with** (or are most opposed to).

1	Ontology: Metaphysics	
	God stands far above life on earth	
	The universe is governed by mechanical, natural laws	
	People look at the world from different perspectives, which are all equally valid	
	Reality is complex: it is both scientific and spiritual at the same time	
2	Ontology: Values of nature	
	Nature is created by God and is therefore valuable	
	Nature has value because humans are able to use and enjoy it	
	People ascribe different values to nature, and all of them are important	
	Nature has value in and of itself, even if it has no value for humans whatsoever	
3	Ontology: Origin of life	
	Life was miraculously created by a higher power	
	Life was brought about through biological evolution (not steered by a higher power)	
	How life originated is still unclear, despite what science and religion say about it	
	I see the universe as a creative expression of an evolving consciousness or 'Spirit'	
4	Ontology: Views on nature	
	Nature can be harsh and unpredictable, but humans can correctly steward it	
	Nature is adaptable and robust, so it will readily recover from the damage	

	caused by us	
	Nature is fragile, so humans can easily destroy its delicate balance	
	Nature is more complex and mysterious than any single perspective can capture	
5	Epistemology: How to know / role of science	
	We depend too much on science and not enough on faith	
	Science is the ultimate source of trustworthy knowledge	
	Morality, art, and intuition are important for gaining knowledge about the world	
	In order to gain understanding of the world, science needs to be integrated with other forms of knowledge, such as spiritual insight	
6	Epistemology: Impacts of science and technology	
	One of the negative effects of science and technology is that they break down people's ideas of right and wrong	
	Science and technology are definitely making our lives healthier, easier, and more comfortable	
	Science and technology are often corrupted by special interests, e.g., of big corporations	
	Science and technology can make beneficial contributions when society is actively engaged with technological developments	
7	Epistemology: What has authority	
	When I'm forming an opinion on an issue…	
	… I tend to trust traditional or religious leaders	
	… I tend to trust scientists and other experts	
	… I tend to trust my own judgment, feelings, and intuition	
	… I try to honour all perspectives and combine them into a larger whole	
8	Axiology: Most important in my life	
	The most important thing in my life is…	
	… to be of service to my family, community, and/or country	
	… to be successful and have people recognize my achievements	
	… to do things my own way and forge my own path in life	
	… to actualize my inner potential and thereby serve the (cultural) evolution of humanity	
9	Axiology: Central values	
	It is very important to me…	
	… to adapt myself to others and behave appropriately and socially	
	… to have enough money to have and do nice things	
	… to be imaginative and express myself in the way I think and live	
	… to explore my inner world so I can live from my 'true' or 'deeper' self	
10	Axiology: Central ethics	
	For me, to live a good life is …	
	… to respect the tradition and honour my community	

	… to be independent and do whatever I enjoy	
	… to support those who are oppressed and dominated	
	… to offer my unique ‘gifts’ to the larger whole of life	
11	Axiology: Preferred lifestyle	
	I strive for…	
	… a sober, simple, and humble lifestyle	
	… a comfortable and fun lifestyle	
	… a diverse and expressive lifestyle	
	… a wholesome and natural lifestyle	
12	Anthropology: Self-identity	
	Who I am is defined by my religion and upbringing	
	Who I am is defined by my social position and/or my achievements	
	I feel to be more a citizen of the world than a citizen of a country	
	I feel part of the vast, interconnected whole that is life and the universe	
13	Anthropology: The human being	
	The human being is the only being on earth with consciousness	
	Human behaviour tends to be rational and functional	
	Human beings think mostly of themselves	
	I think humans have an unlimited potential	
14	Anthropology: The human-nature relationship	
	Humans should behave as protectors of creation	
	By mastering nature, the human being can find freedom	
	Things in nature are generally more perfect than those made by humans	
	On a deep level, I feel to be one with nature	
15	Anthropology: Interference in nature	
	When it comes to interfering with nature, mankind has no right to play God	
	Humans can improve on nature	
	Interfering with nature is risky because it may be too complex for us to understand	
	Aware of their deep connectedness, humans and nature can work together in mutually enhancing ways.	
16	Anthropology: Nature and role of suffering	
	The suffering that happens to people is the will of God	
	The suffering that happens to people does not have meaning but is random	
	The suffering in the world is created and maintained by existing power structures	
	I use the pain and suffering in my life as opportunities for inner growth	
17	Anthropology: Nature of death	
	In an afterlife we will be punished or rewarded for our actions in this life	
	I don’t believe in an afterlife of any form	
	I don’t know what happens to us after we die	

	I believe in reincarnation – that is to say that we will be born again in this world after our death	
18	Societal vision: Relationship individual - society	
	Each individual needs to sacrifice his/her desires to serve the community and society at large	
	Everybody needs to take care of, and stand up for, oneself	
	Society should offer decent care for every individual	
	When individuals thrive and blossom, they naturally start working for a better world for all	
19	Societal vision: societal aims	
	In society…	
	… we should have greater respect for religious authority and tradition	
	… we should place more emphasis on science and technology	
	… we should place more emphasis on art, culture, and moral development	
	… we should place more emphasis on inner growth and self-actualization	

We now would like to ask you some questions with respect to your views on society, politics, and the development of new technologies.

20	When you are considering your vote for the next elections, which three themes play the most important role in your choice of a political party?	
	- Economy and employment	
	- Fair distribution of incomes	
	- Animal rights	
	- Traditional values	
	- Environment, sustainability, and climate change	
	- Health care	
	- Competitive position of Australian companies	
	- Integration of immigrants	
	- Education	
	- Emancipation of women	
	- International position of the USA	
	- Safety and terrorism	
	- Other, namely….	
	- Don't know	
21	If you have the choice between a 'conventional' and a more expensive, environment-friendly 'green' product, which do you tend to choose?	
	- Almost always the normal product	
	- Mostly the normal product	
	- Neutral	
	- Mostly the green product	
	- Almost always the green product	
22	How many days a week do you eat meat (including chicken) with your main meal, on average? If you don't know precisely, you can guess.	

	- Choose from min=0 to max = 7	
	- Don't know	
23	What kind of transportation do you use most frequently?	
	- Car	
	- Motorbike	
	- Scooter	
	- Train	
	- Bus	
	- Metro	
	- Bike	
	- Walking	

Now we would like to know more about how you see climate change and energy.

24	Assuming climate change is happening, do you think it is…	
	- Caused mostly by human activities	
	- Caused mostly by natural changes in the environment	
	- Caused about equally by human activities and natural changes	
	- None of the above because climate change isn't happening	
	- Don't know	
25	How important is the issue of climate change to you personally?	
	- Not at all important	
	- Not very important	
	- Somewhat important	
	- Very important	
	- Don't know	
26	How important is it to you that the Australia becomes energy-independent, that is, able to generate enough energy to meet our own needs?	
	- Not at all important	
	- Not very important	
	- Somewhat important	
	- Very important	
	- Don't know	

27	How much do you support or oppose the following policies?	Strongly oppose	Somewhat oppose	Somewhat support	Strongly support	Don't know	Other, namely…
	Fund research into energy from solar, wind, and water (hydroelectric) power						

	Fund research into bio-energy (including ethanol and biodiesel)						
	Expand drilling for oil, natural gas, and/or shale gas						
	Build or re-open nuclear power plants						
	Provide tax rebates on energy-efficient vehicles and appliances						
	Provide tax rebates on renewable energy (energy from sun, wind, or water, or bioenergy)						
	Require electric utilities to produce at least 20% of their electricity from renewable energy sources (sun, wind, water, or bioenergy), even if it cost the average household an extra $100 a year						
	Sign an international treaty that requires the Australia to cut its emissions of CO2 (the primary greenhouse gas) 70 - 90% by the year 2050.						
	Regulate and tax CO2 (the primary greenhouse gas)						
	Eliminate government subsidies on fossil fuel (oil, coal, gas) production						

28	For each of the following lifestyle-changes, please let us know whether you think this is an	Not effective at all	Not very effective	Effective	Highly effective	Don't know

	effective way of combatting climate change					
	Eat less meat					
	Buy local, seasonal, unprocessed foods (e.g., by going to farmer's markets)					
	Buy (more) organic foods					
	Drive less					
	Fly less					
	Save energy at home (e.g., turning thermostat down, using saving bulbs, air-drying laundry)					
	Install solar panels on my house					
	Buy (more) 'green' products, even when they are more expensive					
	Buy (more of) my clothes and furniture second-hand					
	Participate in climate actions such as writing letters to my local or national representative					
	Discussing the importance of climate change with family and friends more often					
	Vote for political parties that have climate change high on their agenda					
29	For each of the following lifestyle-changes, please let us know whether you are willing to personally make that lifestyle-change (if you are already doing it, you are willing).	Certainly not willing	Likely not willing	Likely willing	Certainly willing	Don't know
	Eat less meat					
	Buy local, seasonal, unprocessed foods (e.g., by going to farmer's markets)					
	Buy (more) organic foods					
	Drive less					
	Fly less					
	Save energy at home (e.g., thermostat down, using saving bulbs, air-drying laundry)					
	Install solar panels on my house					
	Buy (more) 'green' products, even when they are more expensive					
	Buy (more of) my clothes and furniture second-hand					
	Participate in climate actions such					

	as writing letters to my local or national representative					
	Discussing the importance of climate change with family and friends more often					
	Vote for political parties that have climate change high on their agenda					

30	Climate change should be addressed:
	- Mostly by experts and authorities
	- Mostly through the competition of ideas where the best solution wins
	- By engaging stakeholders to formulate a consensus solution
	- By engaging stakeholders in a processes of collaborative innovation leading to win-win solutions

Another important topic these days is modern biotechnology. Modern biotechnology uses genetic modification of living systems, thereby changing the DNA of plants, animals, or micro-organisms, to develop a range of products and services.

First we would like to know your view on the use of genetic modification in food production.

		No, definitely not	No, probably not	Yes, probably	Yes, definitely	Don't know	Other, namely….
31	Do you think it is safe to eat genetically modified food?						
32	Do you think genetic modification of food-crops offers a solution to our problems (i.e. lack of arable land, plant diseases, hunger)?						
33	Do you think governments should support research on genetic modification of food crops?						
34	Would you pay a little more for non-genetically modified food?						

Modern biotechnology is also used for purposes other than food production, such as for the production of energy, medication, and a wide range of materials and products. Modifying the DNA of bacteria, yeasts, and fungi in contained environments can result in a 'green chemistry', which reduces the use of energy and resources, and generates less waste and pollution. Such green chemistry then becomes the basis for various 'biobased' products.

5	Do you think a 'green chemistry' is a good development?	No, definitely not	No, probably not	Yes, probably	Yes, definitely	Don't know	Other, namely…
36	Would you be prepared to pay a little more for biobased products (e.g., bioplastics)?						
37	Do you think governments should support research on biobased technologies?						
38	Do you think governments should provide tax incentives or other subsidies to develop these products?						

Below you get to see several statements on the topic of modern biotechnology. Please select the item that you most agree with, or comes closest to your opinion.

39	Technological intervention in the genetic code (DNA) that we find in nature is…	
	Unacceptable, as changing the structure of nature crosses a fundamental boundary;	
	Promising, as it will mean progress and economic growth;	
	Problematic, as there are too many uncertainties and risks;	
	Potentially promising, but only if implemented with great care and public engagement;	
	I don't know;	
	Other, namely……	
40	My vision on the future of food production is one of…	
	Small and medium-sized family farms that maintain farming traditions;	
	Industrialized farming to feed the world's growing population, including genetically modified crops;	
	Industrialized farming to feed the world's growing population, but without genetically modified crops;	
	Local, organic farms supplying to their own regions. Consumers engaged with where and how their food is produced;	
	I don't know;	
	Other, namely……	
41	Decisions about new technologies that impact society as a whole should be primarily made by … Pick maximum two options.	
	Religious leaders	
	Scientists	
	Businesses	
	Experts in ethical and social impacts	
	The public at large	
	I don't know;	
	Other, namely……	

42	With respect to these new bio-based technologies, whom would you rather trust for managing risks and caring about the environment?	
	Large multinational corporations	
	Local small and medium enterprises	
	Government	
	Expert committees, including scientists	
	NGO's, such as environmental and development organizations	
	Other, namely….	
	I don't know	

Nowadays, policy makers talk about a bio-economy: an economy that runs on plant materials and uses modern biotechnology for energy, pharmaceuticals, and industrial products.

43	This idea to me is….	
	Highly promising (if you choose this option then answer the following question 43b)	
	Promising (if you choose this option then answer the following question 43b)	
	Neutral (if you choose this option then answer the following question 43c)	
	Worrisome (if you choose this option then answer the following question 43c)	
	Very worrisome (if you choose this option then answer the following question 43c)	
	I don't know;	
	Other, namely……	
43b	Why do you consider the idea of a bio-based economy promising?	
	A bioeconomy could help us address some of our most urgent environmental issues, such as climate change and pollution	
	A bioeconomy could help us stay economically competitive internationally	
	A bio-economy could help us become energy-independent	
	I generally have big faith in new technological developments	
	All of the above	
	I don't know;	
	Other, namely……	
43c	Why do you see it this way? Which statement comes closest to your position?	
	The idea of the bio-economy needs more research	
	The idea of the bio-economy needs more public debate	
	There are many risks involved with those new technologies	
	I don't trust the companies that tend to lead these developments	
	All of the above	
	I don't know;	
	Other, namely……	

To finalize this questionnaire, please describe how feel right now (after reflecting on the previous questions):

Thank you for your participation!

B. Brochure

How do you see the world?

Would you like to know your type of worldview?

(then please take 15 minutes to answer a free and confidential online research survey)

My name is Emilia, I am studying a PhD in Sustainable Futures at the University of Technology Sydney (UTS), and I would like to invite you to be part of my research project about how our personal worldviews influence our behaviour.

Make yourself a nice cup of tea, sit back and take fifteen minutes to answer this free and confidential online research survey by following this link:

https://www.surveymonkey.com/s/ISFWV

All completed surveys will go into a draw to win $100, and you will receive an email with the results (a short description of your type of worldview) or an invitation to continue participating in the second phase of this study.

Depending on the range of responses I receive, I may invite you to be part of the second phase of this study which will include two interviews of one hour duration each. Whether you agree to continue to participate will be entirely your decision.

Participants who complete both interviews will receive a second ticket in a draw to win another prize of $100.

UTS:ISF

UTS ethics approval number: UTS HREC REF NO. 2014000739
For more information please contact me at: 11677010@student.uts.edu.au

C. Diagram with wheel of four types of worldviews