USE OF PORTFOLIOS IN ASSESSING COMPETENCY IN APPLIED LEARNING OF MULTIMEDIA

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Certificate

I certify that this thesis has not been submitted for any degree and is not being submitted as part of candidature for any other degree.

I also certify that the thesis has been written by me, and that any help that I have received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

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ABSTRACT

With a view to be integrated into the new senior secondary curriculum from 2009/10 school year, Applied Learning (formerly known as Career-oriented Studies) courses have been piloting for senior secondary students in Hong Kong since 2003. The purpose of this research was to explore the impact of the implementation of portfolio assessment as an authentic assessment method in an applied learning of multimedia course. Specifically, the study had to answer questions of *what* is the improvement of the students' achievement, *what* are the changes in learning attitude and satisfaction of the participants, *how* can portfolios provide evidence of the students' competency, and *what* are the needs of professional development of teachers using portfolio assessment in applied learning.

To evaluate the impact of portfolio implementation, the study collected data from both students and teachers to answer the research questions concerning students and teachers respectively. Both quantitative and qualitative research methods were utilized for the study and relevant research on competence, portfolio and authentic assessment provided the primary theoretical context.

Despite the finding that the introduction of portfolio assessment as one of the assessment methods did not significantly improve the students' achievement, the main contribution of this study is that it was evident that completing a portfolio benefits applied learning students and their portfolio compilation process can lead to an enhancement in student motivation towards learning. The results of the study also provided support that portfolios can be a form of authentic assessment for applied learning.

The study found that portfolios can improve teacher understanding of competency and its assessment which led to a more professional approach by the teachers involved. Finally, the results suggested that teacher professional development should have a significant impact on the portfolio implementation. In order for this form of assessment to be effective, teachers must be trained in the various aspects of the approach.

This study contributed to the literature of new senior secondary education, specifically the development of applied learning courses. To the extent that this study helped identify perceptions of the portfolio assessment by students and teachers, this study also contributed to the teaching and learning using portfolios. It is hoped that the encouraging findings of this study would shed light on the multifaceted benefits of portfolio assessment and would provide sound justifications for its integration into the applied learning curriculums.

CHAPTER ONE

INTRODUCTION

New Academic Structure for Senior Secondary Education

In response to the learning needs of students, the documents *Learning for Life, Learning through Life: Reform Proposals for the Education System in Hong Kong* (2000) and *Learning to Learn* (2001) attempted to set out a broad and balanced curriculum to cater for students' different interests, learning styles and inclinations. A new academic structure for senior secondary education and higher education was then proposed and published in the document entitled *Reforming the Academic Structure for Senior Secondary Education and Higher Education – Actions for Investing in the Future* (2004) followed by public consultation. The Government has decided to adopt a 3-year junior secondary, 3-year senior secondary and 4-year undergraduate academic system ("3+3+4") from the 2009/10 school year to facilitate the implementation of a more flexible, coherent and diversified senior secondary and higher education curriculum.

Under the new "3+3+4" system, three years in the lower secondary system (the current S1 to S3) will be followed by a further 3 years in the senior secondary school for ALL students. The current two high-stake examinations - the Hong Kong Certificate of Education Examination (HKCEE) and the Hong Kong Advanced Level Examination (HKALE) - will be reduced to ONE examination – Hong Kong Diploma of Secondary Education (HKDSE) Examination - to be taken at the end of the senior secondary stage. This examination will include broader assessment methods and be complemented by other means of recognizing students' achievements, in order to build up a more comprehensive students' learning profile. The length of a normal undergraduate degree will be extended from 3 to 4 years.

The consultation document (EMB, 2004) highlighted that the new system is not just for students proceeding to university. It aims to provide a more diversified senior secondary curriculum that includes career-oriented studies awards (recognised by

post-secondary institutions) in combination with other school subjects. Post-secondary institutions offer further education opportunities leading to sub-degree qualifications, including associate degrees, higher diplomas and diplomas, which can be stand-alone qualifications or articulate into full degrees.

Applied Learning in the New Senior Secondary Education

In order to provide diversified options at the senior secondary level, the Education and Manpower Bureau (EMB) (reorganized as Education Bureau (EDB) effective from 1 July 2007) has first introduced the piloting of Applied Learning which is formerly known as Career-Oriented Curriculum (COC) to the public in 2003. The report *The New Academic Structure for Senior Secondary Education and Higher Education – Action Plan for Investing in the Future of Hong Kong* (2005) stated that Career-oriented Studies (COS) is an integral part of the New Senior Secondary (NSS) curriculum that will match the interests and abilities of all students. The consultation report *Action for the Future – Career-oriented Studies and the New Senior Secondary Academic Structure for Special Schools* (2006) summarised the concerns and feedback from various stakeholders on the purpose and position of COS in the NSS curriculum, the curriculum design, course provision and guidance for students, recognition and quality assurance (QA), professional development and funding, and charted the way forward for the implementation of COS.

The main purpose of providing such courses is to cope with the particular needs, aptitudes and interests of students for whom such courses are appropriate. COS will expand the range of opportunities available to school students, enhance their employability, and prepare them better for further vocational education and training.

The following three non-exclusive modes of applied learning implementation were initially conceptualised for piloting:

Mode 1: Courses take place at the venues of course providers and are taught by the staff of course providers. Schools arrange their students to attend the courses according to the timetable agreed with the course providers.

Mode 2: Courses take place mainly in schools and are taught by the staff of course providers. Schools work out the details of the arrangements with course providers on timetable, venue, equipment, etc.

Mode 3: Course providers entrust schools to conduct applied learning courses taught by qualified teachers/professionals employed by schools. Course providers are responsible for quality assurance and issuing of certificates.

The COS has been introduced its first cohort i.e. 2003-05 of piloting into the senior secondary schooling since 2003. In order to better reflect the purpose and position of COS in NSS curriculum, a new name 'Applied Learning' was recommended (EMB, 2006). The new name 'Applied Learning' has been used as a general term for all COS courses, starting from the 2006-08 cohort of piloting.

Schools could implement Applied Learning as part of their senior secondary curriculum in a way similar to the implementation of the other subjects at senior secondary levels. While the applied learning courses are being piloted, schools are encouraged to adopt different modes of implementation by allowing students to enroll in a wide spectrum of courses according to their own interests and learning needs at the venue of course providers, and/or working collaboratively with course providers to offered selected applied learning courses to students at schools.

The applied learning courses were designed according to the principles of balance, coherence, articulation and responsiveness to provide a sound learning platform for students. Applied learning aimed at:

- offering diverse learning programmes for students with interest and inclination in areas other than those provided by the existing school curriculum;
- providing students with the opportunities to explore their orientation for life-long learning and career aspirations in specific areas;
- enabling students to develop generic skills, values and attitudes, acquire the knowledge and skills as well as understand the workplace requirement of a particular professional or vocational area; and

- offering a substantial outcome for students to obtain recognition for further studies, work, or both at the senior secondary level.

Students are prepared for further studies and/or for work as well as for lifelong learning through the development of foundation skills, thinking skills, people skills, and values & attitudes and career-related competencies which will be included in Applied Learning courses in the six areas of studies: (1) Applied Science; (2) Business, Management and Law; (3) Creative Studies; (4) Engineering and Production; (5) Media and Communication; and (6) Services.

While Applied Learning aims at enabling students to understand fundamental theories and concepts through applications and practices, the learning is to be assessed in authentic contexts that allow students to apply their knowledge and skills (EMB, 2006). The assessment will balance the continuous assessment conducted throughout the duration of the course with end-of-module or end-of-course assessments.

There are concerns about the articulation pathways available for students completing Applied Learning courses. Consequently, course providers have to define the learning outcomes of their courses and the assessable components of those outcomes, along with the assessment criteria. The providers also need to define the criteria of the award of 'attainment' to the students who have attained the competency standard.

The Origin of the Study

A multimedia course with title of "Creative Multimedia Studies" has been introduced into the senior secondary schooling since the first piloting of applied learning course in 2003. The course is one of the courses grouped under the area of "Creative Studies". The course is designed to provide senior secondary students with the basic knowledge and practical skills in developing multimedia products. Students will learn to handle different media elements individually and bring them together into creative products like game, animation and visual effects. The course covers basic theories and technologies of digital image capture and processing, digital sound recording and editing, digital video capture and manipulation, visual effects design, animation

principles, game design and basic game programming. It is also aimed at stimulating students' creativity and developing their communication and problem-solving skills through interactive activities and project works. The quotation below is the full text of the course document submitted to EMB describing the learning outcomes of the course.

This course aims at equipping students with the foundation knowledge and practical skills in multimedia that they can apply them in the design and production of computer games, animations or visual effects. Upon completion of the course, students should be able to:

1. *understand the development and utilisation of multimedia in local business and entertainment industry;*
2. *understand and apply the principles of multimedia design*
3. *create and manipulate different media elements;*
4. *design and integrate different media elements together into a multimedia product; and*
5. *demonstrate practical and application skills in multimedia through completing a project with creativity and critical thinking.*

Of the five learning outcomes listed, only the first one can be widely assessed with traditional assessment methods such as examinations. The other outcomes are quite a challenge to assess, especially in an applied learning context. The quotation below is the full text of the course document submitted to EMB describing the assessment of the course.

The course adopts an applied learning approach and places emphasis on developing students' ability and competency in integration and application of multimedia knowledge learnt. A variety of assessment modes including observations, class exercises, written and skills tests, project progress reports and presentation, etc. will be employed to assess the students' learning outcome throughout the course. Assessment will be arranged at regular intervals or at the end of a topic. This will give regular feedback for improving learning and teaching processes, and also

alleviate students' pressure from a one-off examination. The assessment schemes for different modules of the course are as follows:

Module Title	*Continuous Assessment*	*Test*	*Project*	*Contribution(%) to Overall Marks*
Multimedia Fundamentals	*30%*	*70%*	--	*33%*
Media and Design	*30%*	*70% (Skills test)*	--	*33%*
Multimedia Project	--	--	*100%*	*34%*
			Total	*100%*

Continuous Assessment: Students' practical skills are continuously assessed through in-class practical work arranged on regular basis in Modules 1 and 2.

Tests and Project: Two written tests will be arranged in Module 1 and three skills tests in Module 2 to assess students' understanding of the theories / principles and skills taught. A project will be arranged in Module 3 to assess students' abilities in multimedia design documentation, skills in product development, creativity, presentation techniques and teamwork. Project work performance will be evaluated at four stages, namely planning and storyboarding, two interim progress reports and final presentation.

One of the purposes of this study was to give assessment an importance in introducing applied learning comparable to that of traditional didactic teaching. It does not have this at present, although it has long been known that the nature of the assessment in a course has a profound effect on way that students learnt (Snyder, 1970). Hence a crucial aspect of a successful teaching and learning system is student assessment. It is no exaggeration to say that

> *'If you want to change student learning then change the methods of assessment'*
>
> (Brown *et al.*, 1997, p 9).

Elton and Johnston (2002) added that if one changes the method of teaching, but keeps the assessment unchanged, one is very likely to fail. Thus to get the assessment right is vitally important. However, traditional assessment methods which are widely used to assess students' learning outcomes should be complemented with other indicators, including alternative assessments, that show how an applied learner is learning. Examples of alternative assessment include observation and individual or group performance assessment, and portfolios, which can provide a showcase of students' abilities, talents, interests and potentials (Barootchi & Keshavarz, 2002). This assessment procedure has the potential to provide valuable information concerning students' performance in educational settings. Information gathered through portfolio procedures coupled with information gathered by means of standardized assessment measures can better equip students, parents and professionals in making informed decisions regarding educational goals and instructional objectives. Barootchi and Keshavarz (2002) concluded that information gleaned from portfolios can be used to evaluate the effectiveness of instruction and student performance, as well as to develop instructional goals and objectives based on documentation provided by the student in the portfolio.

A portfolio is a purposeful collection of materials assembled over a period of time by a learner to provide evidence of skills, abilities and dispositions as they relate to the learners' field of interest. Portfolio assessment is used as an integral part of learning. Such assessments tell students and their instructors how well they are developing their skills and knowledge and what they need to do to develop them further. Thus portfolio assessment serves as a diagnostic tool, which provides students with profiles of their emerging skills to help them become increasingly independent learners. While a portfolio is a structured collection comprising demonstration that specified learning outcomes have been achieved, it is particularly useful for applied learning of multimedia.

The public consultation document on applied learning courses and the subsequent report on feedback received during consultation have set the way forward about the assessment of applied learning course (EMB, 2006) - "*The applied learning within COS courses will be assessed in authentic contexts that allow students to apply their knowledge and skills. The assessment will balance the continuous assessment*

conducted throughout the duration of the course with end-of-module or end-of-course assessments." In order to improve the assessment of the applied learning course of multimedia, portfolios has been introduced as a form of authentic assessment since the fourth cohort, i.e. 2007-09 pilots. Every student is required to produce his/her own portfolios which document his/her experience of multimedia appreciation, in particular, the ability of the student to identify the key areas or themes that underpin a multimedia product and define the creative angle that may add impact to it. The competency of the students in multimedia literacy and critics will be assessed based on their collections and comments in various real world multimedia products included in the portfolio. The achievement of the portfolio will be contributed as one of the assessment components of the Module I (Multimedia Fundamentals). This study looks at how that portfolio implementation was prompted, describes the impact it made, and discusses the implications.

Significance of the Study

Though applied learning is relatively new in Hong Kong, provision of applied learning courses have grown dramatically in the past few years. As these courses are offered by different course providers, consequently completion of a course offers no recognized standard to the public regarding the competency level of the graduates. Therefore, there is a genuine need to develop recognition of the applied learning courses. The consultation document (EMB 2006) suggested that the courses need to produce learning outcomes which are recognised by employers and further education providers, and verified by the system of assessment they are confident in.

The applied learning of multimedia course has been piloted for several years and the number of students has increased to about 350 in the 2006-08 pilots. Due to the relative newness of applied learning program in local education, research on teaching and learning in this area is limited. Also, the feedback from the industries is very limited as the purpose and position of applied learning in the new senior secondary curriculum have not yet been known by the industries. After the restructuring of curriculum and the introduction of portfolio assessment in 2007-09 pilots, the course was, at the time of the study, at a stage of reflection and consolidation.

Considerable research has been conducted to assess the impact of introducing applied learning courses into the senior secondary education, curriculum design of applied learning courses, and the recognition of and quality assurance for applied learning (EMB 2006). Yet the use of authentic assessment methods in applied learning has not been researched. A review of related literature showed a lack of research studies intended to assess the impact of the use of portfolio assessment on the learner's achievement and attitude in senior secondary education. On the other hand, evidence from literature review that teachers' perception and professional development are key factors in ensuring that changes are effective. It is worthwhile to investigate the impact of the use of portfolio assessment from teachers' perspective in order to understand their perceptions of the use of portfolios as a means of assessing students' competency as well as their professional development needs for the use of portfolio assessment in applied learning.

This study will contribute to the literature of new senior secondary education, specifically the development of applied learning courses. To the extent that this study will help identify perceptions of the portfolio assessment by students and teachers, this study will also contribute to the teaching and learning using portfolios. This study also hopes to provide implications to course providers and faculty concerning the portfolio assessment of applied learning courses.

Aims of the Study

The study set out to investigate the impact of the implementation of portfolios as a form of authentic assessment to assess the student competency in multimedia literacy and critics in an applied learning of multimedia course. The aims of the study were to:

1. Compare the achievement of students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment.

2. Compare the students' satisfaction of the applied learning course with portfolio assessments to satisfaction of students enrolled in the same course without portfolio assessment.

3. Investigate the teachers' perceptions of the use of portfolios as a means of assessment of the students' competency.

4. Investigate the teachers' professional development needs for the use of portfolio assessment in applied learning.

Research Questions

The study aimed to answer the following research questions:

1. Does the use of portfolio assessment contribute to applied learner's achievement?

2. Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?

3. To what extent have portfolios provided a means of assessment of the students' competency?

4. What are current and future professional development needs of teachers using portfolio assessment in applied learning?

Methodology

A research design is formulated based on the purpose of the study, the nature of the research questions, and the available resources. Because this study was concerned with the impact of the implementation of portfolio assessment as an authentic assessment method in an applied learning of multimedia course, it had to answer questions of *what* is the improvement of the students' achievement, *what* are the

changes in learning attitude and satisfaction of the participants, *how* can portfolios provide evidence of the students' competency, and *what* are the needs of professional development of teachers using portfolio assessment in applied learning. Consequently, both quantitative and qualitative research methods were utilized for data collection. Patton (1990) stated "Quantitative and qualitative methods involve differing strengths and weaknesses and constitute alternative, but not mutually exclusive, strategies for research. Both can therefore be used in the same study." (p. 14).

As this study was an attempt to understand the impact of the implementation of portfolios as an assessment method in an applied learning of multimedia course, the study collected data from both students and teachers in order to answer the research questions concerning students and teachers respectively. To facilitate the data collection and presentation, the study was divided into two parts. The first part of the study dealt with data from the students while the second part of the study collected data from the teachers concerned.

The first part of the study focused on the students and the participants were the entire class of "Creative Multimedia Studies" of 2006-08 cohort (n =300) and 2007-09 cohort (n=250). The applied learning course was offered by the Department of Multimedia and Internet Technology, Hong Kong Institute of Vocational Education (Tsing Yi).

The first research question was concerned with the impact of portfolio assessment on students' achievement between the students participating in applied learning course with portfolio assessment versus those students enrolled in the same course without portfolio assessment. The study utilized quantitative research methods to answer precisely what students in the cohort of applied learning course with and without portfolio assessment achieved, and if any statistical differences existed between the two groups.

The second research question was concerned with the students' attitude towards their learning experience. A questionnaire was utilized to gather rich, detailed data about the students' opinion and attitude with or without portfolio assessment impacted on their learning. Quantitative research methods were used to check if any statistical

differences existed between the two groups.

The second part of the study focused on the teachers and the participants were the teachers (n=10) who had taught the Module I of 2006-08 and 2007-09 cohorts of the applied learning course Creative Multimedia Studies. This part of the study aimed to answer the third and fourth research questions.

A questionnaire was used to collect the teachers' opinion and follow up interview were conducted to discuss about their feedback and concerns regarding a change in the assessment method introduced in the applied learning course. It was aimed to find out whether the use of portfolios was an effective tool for assessing competency and its implications for the needs of professional development.

Qualitative research deals with "understanding the meaning people have constructed, how they make sense of their world, and the experiences they have in the world" (Merriam, 1998, p. 6). Both quantitative and qualitative research methods were used to analyze the data collected and findings about the teachers' perceptions on the use of portfolios for assessing a student's competency and their professional development needs.

Overview of the Thesis

There are six parts in this thesis. Chapter One is an introduction that sets out the background about the new academic structure of senior secondary education proposed and Applied Learning courses introduced. The origin, significance and aims of the study are presented with the four research questions concerning the impact of the implementation of the use of portfolios as a form of authentic assessment to assess the competency of the students in multimedia literacy and critics in applied learning of multimedia from both students' and teachers' perspectives.

Chapter Two presents the findings from the relevant literature review which serves as the foundation theories of the research. Chapter Three outlines the methodology for the research including research design, subjects of the study, data collection method,

and analysis tools. Results are presented in Chapters Four and Five for the two parts of the study respectively.

Chapter Four begins the presentation of results by comparing data in terms of the students' achievement and learning attitude between the two groups of students with and without portfolio assessment. The results are analyzed to answer if any statistical differences existed between the two groups.

In Chapter Five the focus is on addressing the perceptions of teachers about the effectiveness of portfolio assessment for assessing students' competency and the consequent professional development needs. Results collected from questionnaire survey and interview with teachers are presented and analyzed. Finally, Chapter Six discusses results and presents the conclusions of the research.

CHAPTER TWO

LITERATURE REVIEW

The review of the literature begins with an overview of the development of the applied learning multimedia course for senior secondary students in Hong Kong. The report *Action for the Future – Career-oriented Studies and the New Senior Secondary Academic Structure for Special Schools* (2006) states that the diversity of applied learning is extended to the methods of learning, teaching and assessment, as wells as the environments in which the learning takes place. Applied learning courses provide a context for students to develop skills in the workplace such as abilities to communicate, to adapt to uncertainty and change, to work in teams, to solve problems, to move across boundaries and cultures, and to reflect on and manage oneself. The curriculum and assessment framework for applied learning stresses that the courses are selected according to their abilities to provide authentic contexts and experiences which assist the personal growth of students by stimulating their interest and motivation.

The public consultation document on applied learning courses and the subsequent consultation report further set the way forward about the assessment of applied learning course (EMB, 2006) - "*The applied learning within COS courses will be assessed in authentic contexts that allow students to apply their knowledge and skills. The assessment will balance the continuous assessment conducted throughout the duration of the course with end-of-module or end-of-course assessments.*

In order to understand the relationship between competency and authentic contexts, the literature review then starts with the definition of competency and different ways of assessing competency. The current development of competency-based assessment in local vocational education and training (VET), and Specification of Competency Standards (SCS) which are being developed by The Industry Training Advisory Committees in Hong Kong are also included for a better understanding of the local environment.

Next, the literature review will focus on the theories about assessment and, particularly, assessment methods suitable for assessing competency in Applied Learning. What follows, is the brief introduction to the authentic assessment which is believed that it can engage students in applying and/or demonstrating knowledge and skills in real world situations.

In the latter half of this chapter, a great portion of the literature review is devoted to portfolio assessment and the advantages and disadvantages entailed in using portfolios as a part of an assessment mechanism. With the paradigmatic shift in the field of education, where traditional teaching and assessment methods' with their narrow focus on products alone are being replaced with innovative and process-oriented practices, portfolios are gaining greater stronghold globally. Because the teacher plays an important role in teaching and learning, the literature review concludes with an examination of the implications and professional development needed for teachers using portfolio assessment.

Development of Applied Learning of Multimedia

At the turn of the twenty-first century, multimedia holds a key place in the knowledge-based economy, affecting numerous facets of business and private life. Multimedia is expected to change our lives completely. It will transform all of the economic and social activity sectors, specifically health care, education and training, entertainment, trade and communications. This trend seems to be a global initiative as research investigating and discussing the field of multimedia and its education comes from all regions of the world (e.g. Dion, 2001; Gonzalez, Cranitch & Jo, 2000; CREATE Australia, 1998; Stiles, 1995).

Multimedia is not so much an industry as a descriptive term defining a growing range of applications across business, education, entertainment, information, etc. that involve the integrated use of different media such as text, sound, video, film, photography, two dimensional (2D) and three dimensional (3D) graphics, animation, etc., usually involving digital technology, non-linear application navigation and a capacity for user interaction with the multimedia product (CREATE Australia, 1998).

Examples of applications of multimedia are: business, education, games, entertainment, information, retailing, and personal services, etc. There are mixed opinions on whether there is such a thing as a "multimedia industry" (CREATE Australia, 1998). However, it was still confirmed that it is a group of organizations primarily involved in producing multimedia products for one or more applications.

As Hong Kong is becoming a knowledge-based society, an increasing proportion of the workforce now works in the IT sector of the economy. Multimedia is closely associated with many leading or emerging technologies; it therefore plays an important role in a digital-based economy. It is perceived that multimedia will progressively have a major impact on businesses, communications, education, entertainment and our daily life in the years to come.

Many industries need creative artists and technologists who can use multimedia and digital technologies to produce visual and sound effects for music, entertainment, performing arts, television, advertising, publishing and animation. As highlighted in a recent report on Creative Industries (HKTDC, 2002), these are the potential major areas for growth in Hong Kong in the near future. It is estimated that creative industries as a whole account for 3.7% of Hong Kong's total employment, 3.1% of services exports and 2% of Gross Domestic Products.

Though multimedia as a discipline of education is relatively new in Hong Kong, provision of multimedia related courses in post-secondary education have grown dramatically in the past few years. There are numerous multimedia related courses offered in higher diploma, bachelor degree and master degree levels. Examples of multimedia course offered by the local institutions are tabulated in Table 2.1.

Table 2.1 Multimedia courses offered by local institutions

Institution	Course Title/Award
The Polytechnic University of Hong Kong	M.Sc. Multimedia and Entertainment Technology
The Polytechnic University of Hong Kong	B.A. (Hons) Digital Media
City University of Hong Kong	B.A. (Hons) Creative Media
City University of Hong Kong	B.Sc. (Hons) Creative Media
The Polytechnic University of Hong Kong	Higher Diploma in Multimedia Design and Technology
City University of Hong Kong	Associate of Arts in Media Technology
Hong Kong Institution of Vocational Education	Higher Diploma in Multimedia Web Development and Digital Entertainment
Hong Kong Institution of Vocational Education	Higher Diploma in Multimedia Advertising and Visual Effects
Hong Kong Institution of Vocational Education	Higher Diploma in Creative Media and Entertainment Technology
Hong Kong Design Institute	Higher Diploma in Multimedia Exhibition Design
Hong Kong Design Institute	Higher Diploma in Digital Media Design

In order to provide diversified options at the senior secondary level, the Education and Manpower Bureau (EMB) has first introduced the piloting of Applied Learning which is formerly known as Career-Oriented Curriculum (COC) to the public in 2003. The report *The New Academic Structure for Senior Secondary Education and Higher Education – Action Plan for Investing in the Future of Hong Kong* (2005) stated that Career-oriented Studies (COS) is an integral part of the New Senior Secondary (NSS) curriculum that will match the interests and abilities of all students. According to EMB, the applied learning courses were designed according to the principles of balance, coherence, articulation and responsiveness to provide a sound learning platform for students. Applied learning aimed at:

- offering diverse learning programmes for students with interest and inclination in areas other than those provided by the existing school curriculum;

- providing students with the opportunities to explore their orientation for life-long learning and career aspirations in specific areas;
- enabling students to develop generic skills, values and attitudes, acquire the knowledge and skills as well as understand the workplace requirement of a particular professional or vocational area; and
- offering a substantial outcome for students to obtain recognition for further studies, work, or both at the senior secondary level.

In view of the popularity of learning of multimedia and the increasing demand of related jobs in Hong Kong, a multimedia course with title of "Creative Multimedia Studies" has been introduced into the senior secondary schooling since the first piloting of applied learning course in 2003. The course is one of the applied learning courses grouped under the study area of "Creative Studies". The course is designed to provide senior secondary students with the basic knowledge and practical skills in developing multimedia products. Students will learn to handle different media elements individually and bring them together into creative products like game, animation and visual effects. The course covers basic theories and technologies of digital image capture and processing, digital sound recording and editing, digital video capture and manipulation, visual effects design, animation principles, game design and basic game programming. It is also aimed at stimulating students' creativity and developing their communication and problem-solving skills through interactive activities and project works.

The course adopts an applied learning approach and places emphasis on developing students' ability and competency in integration and application of multimedia knowledge learnt. A variety of assessment modes including observations, class exercises, written and skills tests, project progress reports and presentation, etc. are employed to assess the students' learning outcome throughout the course. Assessment will be arranged at regular intervals or at the end of a topic. This will give regular feedback for improving learning and teaching processes, and also alleviate students' pressure from a one-off examination.

Students' practical skills are continuously assessed through in-class practical work arranged on regular basis. Written tests and skills tests are arranged to assess students'

understanding of the theories / principles and skills taught. Finally, a project will be arranged to assess students' abilities in multimedia design documentation, skills in product development, creativity, presentation techniques and teamwork. Project work performance will be evaluated at four stages, namely planning and storyboarding, two interim progress reports and final presentation.

One of the major concerns as pointed out by the consultation report on applied learning (EMB 2006) is that 100% assessment by the course provider will lead to unfair assessment and affect the recognition of applied learning courses. It is proposed that the Hong Kong Examinations and Assessment Authority (HKEAA) will be responsible for the moderation of assessments made by individual course providers to assure comparability of assessment results within individual courses, and across the six applied learning areas of studies. Moreover, HKEAA is expected to coordinate the development of some common assessments that can apply within the areas of learning to assist in carrying out its moderation responsibilities.

Another concerns is about the relationship between COS qualifications and Standards-Reference Assessment (SRA) levels of the New Senior Secondary (NSS) subjects, especially the SRA level which will match the COS 'attainment' or competency level.

Hong Kong has an examination driven education system where formal assessment dominates to the detriment of effective and creative teaching and learning (Education Commission, 1996). Some teachers teach to the test, there is a narrowing of the curriculum and pedagogical practice is constrained and sometimes based on outmoded learning theory. Assessment by teachers in Hong Kong primary and secondary schools is based on a psychometric model and an 'ethos of testing' exists. At the tertiary level, there is evidence that the assessment of undergraduates has also subjected to a measurement model of assessment (Biggs, 1996).

Public examination results will remain as a key criterion for screening prospective applicants by academic institutions for admission and by employers for employment. Nonetheless, traditional assessment has been criticized for being too examination-oriented. The Reform Proposal of the Education Commission (2000) recommended

that schools to adopt a diversified assessment model and minimize the use of quantitative assessment to make way for more analytical assessment.

Assessment of learning can serve a variety of purposes, and the choice of assessment depends in part on how the assessment information will be used. Vocational teachers use the results of tests and other assessments to monitor the progress of students, diagnose their needs, and make instructional plans. When students complete courses or sequences of courses, vocational programs use assessments to certify that students have achieved a required level of mastery or have met industry standards. Finally, aggregated information about student progress is used to judge the quality of vocational programs. Although a single assessment may be used for many purposes - for example, standardized test results are used by teachers to identify individual student weaknesses and target instruction, and they are used by legislators and the general public to judge the quality of the education system it may not be equally effective for them all.

While the applied learning course is designed to extend the methods of learning, teaching and assessment, as well as the environments in which the learning takes place, the consultation report on applied learning (EMB, 2006) pointed out that the ability of the course to provide authentic contexts and experiences is essential to assist the personal growth of students by stimulating their interests and motivation. Moreover, in order to verify the learning outcomes that are recognized by employers and further education providers, assessing competency in authentic contexts is thus considered particularly important in applied learning. The document *Applied Learning Curriculum and Assessment Guide (Senior Secondary Level)* (2009) further stated that courses under the creative studies should contain curriculum component of "Understanding and interpreting workplace requirements through practicing the basic skills in an authentic or near authentic environment."

With the aim of improving the assessment of the applied learning course of multimedia, portfolios has been introduced as a form of authentic assessment since the fourth cohort, i.e. 2007-09 pilots. Every student is required to produce his/her own portfolios which document his/her experience of multimedia appreciation, in particular, the ability of the student to identify the key areas or themes that underpin a

multimedia product and define the creative angle that may add impact to it. The competencies of the students in multimedia literacy and critics will be assessed based on their collection and comments in various real world multimedia products included in the portfolio. The achievement of the portfolio will be contributed as one of the assessment components of the Module I (Multimedia Fundamentals).

Assessing Competency

Competency can be defined as the combination of the knowledge, attitudes and skills necessary for carrying out professional tasks or performing to the standards required in the employment. Pithers (1998, p.2) stated that "Competency is about what attributes underlie successful performance", and Rylatt and Lohan (1995, p.47) stated that "Competencies are a description of the essential skills, knowledge and attitudes required for effective performance in a work situation". Here the skills, knowledge and attitudes constitute attributes, and competency resides in the possession of these attributes to a standard, which enables effective or successful performance. Chickering and Claxton (1981, pp. 11-19) proposed four basic principles that underlie competence:

(1) Competence is internal and external, situational and personal
(2) Competence is limited by a person's perception, neurological system, and character.
(3) Achieving competence requires diverse learning styles.
(4) Competence itself is a motivational force.

These principles imply that competence is, in a sense, more than the sum of its discrete parts, and involves "complex interactions among these" (Chickering & Claxton, 1981, p.19), which can occasion both objective and subjective learning and practice outcomes. As well, it is noted here that the third of these principles, regarding diverse learning styles, sees learning as a four-stage learning cycle, one ability of which is "reflective observation".

There has also been a substantial move in most western countries, such as the United States, Great Britain and Australia to develop a series of truly generic competencies.

The former National Training Broad of Australia developed a broad definition of competency which incorporated underpinning knowledge as well as values and attitudes. Key competencies were also developed to detail the necessary skills and attributes all young people should have on entering the workplace. They were to be incorporated into education and training programs operating in sectors other than the VET sector – that is, the secondary and higher education sectors. These competencies are:

- collecting and analysing information
- communicating ideas and information
- planning and organising activities
- working with other in teams
- using mathematical ideas and techniques
- solving problems
- using technology

Nevertheless, even though the generic competencies have usually been designed by 'expert' committees they have not been subjected to extensive empirical test. They tend to be fairly vaguely stated and, as well, it is often unclear whether they are truly generic in nature.

Wolf (1989) and Gonczi *et al.* (1993) point out that competency cannot be observed directly, but can only be inferred from performance. Hence, under a performance-based assessment system, assessors will judge from evidence based on performance whether an individual meets criteria specified in competency standards. The benefits of this approach are the ability to identify learning needs, provide insight into areas of professional practice and allocate educational resources for training. The use of competency statements can also facilitate self-directed, individualized learning by enabling practitioners to reflect on their current practice. Compared with the traditional approach to assessment of practice, the performance-based approach is potentially more valid. It comes closer to assessing what we want to assess, which is the capacity of the professional to integrate knowledge, values, attitudes and skills in the world of practice (Gonczi, 1994).

Gonczi (1994) pointed out that unlike the English model, which is concerned more with assessing competency rather than with how it is developed, the Australian model is committed to examining educational 'inputs' into competency development. He further states that in order for assessors to make judgements about competency the following principles should be followed:

- Assessment methods should be used in an integrated manner, seeking to combine knowledge, understanding, problem-solving, technical skills, attitudes and ethics in assessment. However, there will almost inevitably be occasions on which knowledge will need to be tested independently of performance, as it is the best basis for inference beyond the present situation (Wolf, 1989).

- Methods that are most direct and relevant to what is being assessed should be selected. The reason is that the criteria for judgement will be clear to learners and problem-solving is context-specific.

- To develop a broader evidence base, and so increase the validity of assessment, a variety of methods should be used, including the indirect assessment of knowledge.

Gonczi (1994) concluded that a holistic approach to assessing competency is likely to be more valid than and equally reliable as current methods.

Competency-based training (CBT) is an approach to vocational education and training (VET) which is based on outcomes and predetermined standards, on what students can do rather than the courses they have followed. This is to develop curricula from an analysis of roles to be filled on completion of the educational program. Rather than exams that simply assess mastery of course material, the focus is on the ability of students to demonstrate proficiency or competency in these external roles. CBT first emerged in the United Kingdom in the late 1980s and since then has been introduced in Australia, New Zealand, South Africa, a number of European countries and, more

recently, in Mexico and other Central American countries. It was a response to growing awareness that too little attention had been paid to the needs of those undertaking middle-level education and training at technician and trade level (Arguelles & Gonczi, 2000). In many countries, there was also increased recognition of the need to improve the skills and knowledge of all industrial workers, irrespective of level, and to do so on a continuing basis. Indeed, the notion of an unskilled worker has rapidly become obsolete in particular industries. Consequently, CBT has become the framework for addressing the deficiencies of VET and it has been adopted as training reform policy so widely in the Western World.

CBT has emerged in recent decades and writers in this field acknowledge the difficulty of framing a single and comprehensive definition of CBT (cf Goldhammer and Weitzel, 1981, p.43). Indeed, after some nearly 20 years of international experience with varying approaches to CBT, it seems that the debates surrounding its definition.

Australian Chamber of Commerce and Industry (1992) defined CBT as a way of approaching (vocational) training that places primary emphasis on what a person can do as a result of training (the outcome), and as such represents a shift away from an emphasis on the process involved in training (the inputs). It is concerned with training to industry specific standards rather than an individual's achievement relative to others in the group.

Because of differing views about what CBT involves, Smith and Keating (1997) have summarised the characteristics of CBT as:

- based on competency standards
- focussed on outcomes not inputs
- involving industry
- taking account of recognition of prior learning
- modularised
- self-paced
- assessment based on demonstration and skills rather than knowledge
- assessment criterion-referenced and ungraded

- flexible delivery
- competencies are widely recognised

The study *Making a Difference? How competency-based training has changed teaching and learning* (Smith *et al.*, 1997) has identified fourteen features of CBT which were derived from the literature and from previous study. Eight of these features are related to assessment:

- Assessment is criterion referenced not norm referenced
- Assessment on demand
- Assessment at least partly in the workplace whilst working
- Assessment is based on competency standards
- Assessment is based on demonstration of skills
- Non-graded assessment
- Assessment criteria are made public to students

As competency-based programmes are relatively new to Hong Kong, only a few examples can be found on business and management development areas and teacher training. They are mostly linked to those in countries such as United Kingdom and Australia. Vocational Training Council (VTC), the biggest vocational education organization in Hong Kong, has taken a leading role of adopting competency-based approach in education and assessment. VTC provides job related training and education to more than 120,000 people every year through its Hong Kong Institute of Vocational Education (IVE) and its 20 training and development centres. The main aim of the VTC is to provide and promote a cost-effective and comprehensive system of vocational training to meet the needs of the economy. It seeks to become the leading qualifying body and provider of vocational education and training in the region.

Ng and Lui (2002) outlined the various competency-based efforts undertaken by the VTC in recent years and, in particular, some of the special projects at the Department of Business Services and Management of the IVE, Tsing Yi. In competency-based assessment, multiple modes of gathering assessment evidence are recommended. The

various methods may include interview, simulation, student presentation, observation, project, learning journal, and portfolio, etc.

Ng and Lui (2002) further pointed out the benefits of competency-based assessment:

- A qualification that adopts a competency-based approach provides employers with an indication of the level of ability reached the student for a particular job position.
- It will further help the employers select perspective employees based on demonstrated skills rather than academic qualifications alone.
- Students will be motivated towards meeting expected standards of performance that are clearly communicated to them.

In order to develop the competency-based assessment, course providers also seek to clarify the relationship between courses and the Specification of Competency Standards (SCS) which are being developed by the Industry Training Advisory Committees in Hong Kong. The SCS for an industry mainly comprises the competency standards required at various levels. These competency standards represent the industry benchmarks for the skills, knowledge and attributes required to perform a job at a certain level. The competency standards will be grouped together to form a qualification at a particular level. The assessment guidelines for the outcome standards will also be stipulated in the SCS.

The development of SCSs is an important step in implementing the Qualifications Framework (QF) and its associated quality assurance mechanism. Qualifications recognized under the QF are outcome-based and are not confined to academic attainment. In the case of the academic sector, the outcome standard of qualifications is mainly the knowledge and skills a person possesses. Generally, these standards are set by scholars. In the vocational sector, the outcome standards of qualifications are set by individual industries. To identify the specific outcome standards required for different levels of qualifications, these industries need to develop SCSs.

Assessment for Applied Learning

Assessment has always been an important facet of the accountability framework in the education process. Since schooling began, the testing of students to ascertain their achievement has been part of the structure. While the introduction of applied learning into the senior secondary schooling is to diversify the learning opportunities available to students, the course providers are responding to increased public concern about the approach of assessment adopted. The applied learning within applied courses will be assessed in authentic contexts that allow students to apply their knowledge and skills. The assessment will balance the continuous assessment conducted throughout the duration of the course with end-of-module or end-of -course assessments (EMB, 2006).

In applied learning, an attempt was made to distinguish two aspects of classroom behaviour: learning new knowledge and skills through alternative approach, and proving that the learning has been accomplished through a more authentic form of assessment. The applied learning course wants a blend of formats with emphasis on the need for assessment which possesses broad potential for indicating the competency of student. As the discussion proceeds, focus falls upon authentic assessment instruments such as portfolio assessment and its potential to provide clear indications of student competency.

Assessment can have a number of different purposes: selection and/or grading; maintaining standards; motivation of students; feedback to students, etc. There may well be others and not all of them can be achieved with a particular assessment method. Different purposes may need different methods. However, the overall aim of any educational programme should be that it leads to student learning. This may be obvious, but what is less obvious is whether assessment has a part to play in this. Elton and Johnston (2002) stated that the purposes of assessment can be polarised into *assessment for learning*, also known as *formative assessment*, and *assessment for decision making*, also known as *summative assessment*. Summative assessment is generally carried out at the end of a course or project. In an educational setting, summative assessments are typically used to assign students a course grade. Formative assessment is generally carried out throughout a course. In an educational

setting, formative assessment might be a teacher or the learner, providing feedback on a student's work, and not necessarily be used for grading purpose. It is possible for an assessment to have both formative and summative aspects, but when the summative aspects are dominant, as they are for instance in most examination papers, formative aspects frequently get ignored. On the other hand, much course work assessment can be both formative and summative.

An assessment is valid, if it assesses what it is intended to assess, which is usually specified in terms of the learning objectives which are to be assessed. Since the performance which is assessed through any form of assessment is inevitably different from the corresponding performance under more normal circumstances, the validity of the assessment can only be gauged by appropriate experts and can never be 100%. Points which experts will look for are that the assessment must fairly reflect the programme objectives which are to be assessed, i.e. it must not be testing

- outside the programme objectives
- too selectively within the programme objectives
- at an inappropriate level of the programme objectives (Elton & Johnston, 2002)

One way to apparently ensure greater validity is to specify objectives very precisely, in the extreme in behavioural terms. However, this distorts the learning that is being assessed, since it focuses it in a most constraining way. Good learning is always more than being able to jump through pre-specified hoops, however well the hoops are pre-specified. It is generally agreed that learning objectives must not be specified either too tightly or too loosely, if the learning is to be validly assessed.

Reliability relates to the consistency of an assessment. A reliable assessment is one which consistently achieves the same results with the same (or similar) cohort of students. According to Elton and Johnston (2002), there are two kinds of reliability which a measuring instrument must satisfy:

1. Two people who use the same instrument to measure the same thing should get the same result (examiner reliability)

2. Two supposedly equivalent instruments should give the same result when measuring the same thing (test reliability)

Innumerable investigations have shown that educational assessment at best is only moderately reliable in the first sense. Test reliability is far more difficult to verify, since it requires two supposedly equivalent tests to be given under the same conditions to the same students. However, it has been investigated, with the result that by and large the best students came out best on both tests and the worst students worst on both, but the ranking of middling students was very different in the two tests investigated. This is particularly important for multiple choice tests, which are 100% reliable in the first sense, but can be very unreliable in the second.

A good assessment has both validity and reliability, plus the other quality attributes noted above for a specific context and purpose. In practice, an assessment is rarely totally valid or totally reliable. The nature of assessment influences the level of student engagment in learning process. In seeking to enhance student understanding through greater engagement, the nature of assessment demands marked consideration in relation to the impinging tensions that influemce that nature. The tensions are generated between syllabus fidelity and innovation, learning and auditing, formative and summative assessment, and criterion-referenced and norm-referenced assessments. The list continues with value-adding versus absolute standards, traditional verus alternative assessment, authentic versus contrived assessments, speeded tests versus power tests, and standardised versus classroom generated tests. Those assessment tensions are key issues which require consideration in any broad discusssion on the nature of assessment.

Norm and criterion referenced assessment are two distinctly different methods of awarding grades that express quite different values about teaching, learning and student achievement. Norm referenced assessment, or 'grading on the curve' as it is commonly known, places groups of students into predetermined bands of achievements. Students compete for limited numbers of grades within these bands which range between fail and excellence. This form of grading speaks to traditional and rather antiquated notions of 'academic rigour' and 'maintaining standards'. It says very little about the nature or quality of teaching and learning, or the learning

outcomes of students. Grading is formulaic and the procedure for calculating a final grade is largely invisible to students.

Criterion referenced assessment has been widely adopted in recent times because it seeks a fairer and more accountable assessment regime than norm referencing. Students are measured against identified standards of achievement rather than being ranked against each other. In criterion referenced assessment the quality of achievement is not dependent on how well others in the cohort have performed, but on how well the individual student has performed as measured against specific criteria and standards. Underlying this grading scheme is a concern for accountability regarding the qualities and achievements of students, transparency and negotiability in the process by which grades are awarded, an acknowledgement of subjectivity and the exercise of professional judgement in marking. Criterion-referencing is an effective, constructive strategy, particularly in formats such as portfolios.

Criterion-referencing provides a better setting against which to assess achievement (Killen, 2000) and the approach means that the process is built around essential educational goals (Spady, 1994). The entire package, the syllabus, the teaching, the learning and assessment, is then organized to facilitate the realization of those goals.

Black (1994) asked whether the public could understand that learning based on such goals shows that traditional assessments are often inadequate and damaging. Students' emotional states must be considered in relation to assessment adequacy and the potential stress-related damage induced through testing. Goleman (1995) said in consideration of the of that potential, some assessment tasks need to be reformatted as success in life is governed more by one's Emotional Intelligence Quotient (EQ) than the traditional Intelligence Quotient (IQ).

Authentic criterion-reference assessment, with students working on problems with local context at their own pace, becomes value-adding, whereas closed contrived assessment, as in centralized testing, offering no such quality. While reasonable time controls need to be set in many instances, the absolute control over the time that students spend on test fails to account for their individual differences. Authentic assessment ensures that adequate time is allowed, catering for student difference while not detracting from accountability.

The main purpose of providing applied learning courses is to cope with the particular needs, aptitudes and interests of students for whom such courses are appropriate. Applied learning will expand the range of opportunities available to school students, enhance their employability, and prepare them better for further vocational education and training (EMB, 2006). The consultation report further recommended that the learning is to be assessed in authentic contexts that allow students to apply their knowledge and skills (EMB, 2006).

Specifically, the document *Applied Learning Curriculum and Assessment Guide (Senior Secondary Level)* (2009) defined that the assessment objectives of an Applied Learning subject should cover each of the five curriculum pillars stipulated in the curriculum framework:

- Career-related Competencies
- Foundation Skills
- Thinking Skills
- People Skills
- Values & Attitudes

Given the authentic nature of Applied Learning, assessment of career-related competencies is thus required to be carried out in an authentic or near authentic environment in order to access students' understanding and interpreting workplace requirements as well as experiencing workplace requirement through practice in workplace.

There is a wealth of research devoted to define authentic context. Jonassen (1991) contended that context provides 'episodic memory cues that make the acquired knowledge more memorable' (p. 37). Within learning environments, Rogoff (1984) defined context as 'the problem's physical and conceptual structure as well as the purpose of the activity and the social milieu in which it is embedded' (p. 2). McLellan (1994) has pointed out that context in learning environments can be provided by: the actual work setting, a highly realistic surrogate of the work environment, or an anchoring context such as a video or multimedia program.

Authentic Assessment

Wiggins (1989) defined authentic assessment as activities that engage students in applying and/or demonstrating knowledge and skills in real world situations. Authentic assessment engages students in applying knowledge and skills in the same way they are used in the "real world" outside school. It is performance-based assessment that requires a student to go beyond basic recall and demonstrate significant, worthwhile knowledge and understanding through a product, performance or exhibition.

Another definition from Torrance (1995): 'Authentic assessment' is a generic term ... to describe a range of new approaches to assessment. The basic implication of the term seems to be that the assessment tasks designed for students should be more practical, realistic and challenging than what one might call 'traditional' paper-and-pencil tests. (Torrance, 1995, p.1)

It is believed that authentic assessment is a more appropriate means to assess learning compared to traditional assessments such as norm-reference and standardized testing that assesses recall of factual content knowledge (Torrance, 1995; Herington & Herington, 1998; Ward & Lee, 2002). Authentic assessment utilizes performance samples or learning activities that encourage students to use higher-order thinking skills. Wiggins (1990) compared the difference between traditional and authentic assessment, and stresses that assessment is authentic if it is realistic and requires that students use knowledge obtained in many ways. Table 2.2 summarizes Wiggin's differentiation of authentic and traditional assessment.

Table 2.2 A comparison of authentic and traditional assessment (Wiggins, 1990)

Authentic Assessment	Traditional Assessment
Direct examination of student performance on worthy intellectual tasks	Relies on indirect or proxy items
Requires students to be effective performers with acquired knowledge	Reveals only whether students can recognize, recall or 'plug in' what was learned out of context
Present the student with a full array of tasks	Conventional tests are usually limited to pencil-and-paper, one-answer questions
Attend to whether the student can craft polished, thorough and justifiable answers, performances or products	Conventional tests typically only ask the student to select or write correct responses - irrespective of reasons
Achieves validity and reliability by emphasizing and standardizing the appropriate criteria for scoring varied products	Traditional testing standardizes objective 'items' and the one 'right' answer for each
'Test validity' should depend in part upon whether the test simulates real-world 'tests' of ability	Test validity is determined by matching items to curriculum content
Involves ill structured challenges that help students rehearse for the complex ambiguities of professional life	Traditional tests are more like drills, assessing static and too-often arbitrary elements of those activities

Ewing (1998) further stressed that traditional assessments are limiting due to the following factors: (1) they establish what is taught; (2) their inflexibility reduces possible content; (3) they tend to constrict learning to 'multiple choice'; (4) the results are open to possible misuse and misunderstanding. Authentic assessment allows for directly measuring student achievement on important, appropriate tasks through active and flexible learning methods.

However, Ewing (1998) also pointed out several factors that must be taken into consideration: (1) authentic assessment may not be appropriate in all cases; (2)

authentic assessments must be credible, publicly supported, and legally acceptable; (3) expectations may be too high; (4) generalizing from authentic assessments may become unrealistic as the number of tasks required can become impractical; (5) cost and inefficiencies in developing and implementing such assessment tools may become too high (both in terms of money and time). From this discussion Ewing concluded that authentic assessments will not replace traditional assessment methods but that there is a future for such methods, granted that conditions are right and the problems with developing such methods are addressed.

Herrington and Herrington (1998) have defined seven essential characteristics of authentic assessment in categories of context, the student's role, authentic activity and indicators as list in Table 2.3.

Table 2.3 Herrington and Herrington's (1998) essential elements of authentic assessment

Categories	Criteria
Context	• Requires fidelity of the task to the conditions under which the performance would normally occur • Requires connectedness and transfer to the world beyond the classroom
Student factors	• Requires students to be effective performers with acquired knowledge, and to craft polished, performances or products • Requires significant student time and effort in collaboration with others
Task factors	• Involves complex, ill structured challenges that require judgement, multiple steps, and a full array of tasks • Requires the assessment to be seamlessly integrated with the activity
Indicators	• Provides multiple indicators of learning • Achieves validity and reliability with appropriate criteria for scoring varied products

Hart (1994) categorized authentic assessment into performance assessment, portfolio assessment, and reflection and self-assessment. He further defined that performance assessments test students' ability to apply acquired knowledge and skills in a variety of authentic contexts and work collaboratively to solve complex problems. Portfolio assessment involves developing a portfolio that documents learning over time. Reflection and self-assessment requires students reflect and evaluate their own participation, learning progress, and products which are essential component of autonomous learning.

Karge (1998), Morris (2001), and Prestidge and Williams Glaser (2000) described a variety of authentic assessment tools that are intended to increase students' engagement and make learning more relevant. These include: (1) role play and drama; (2) concept maps; (3) student portfolios; (4) reflective journals; (5) utilizing multiple information sources; (6) group work in which team members design and build models. Authentic assessment provides a measure by which student academic growth can be gauged over time while capturing the true depth of student learning and understanding. It moves beyond the practices of traditional tools and tasks and allows for a greater expression of students' abilities and achievements.

Research also shows that there appears to be substantial agreement about the conditions that are necessary to ensure the success - as measured by changed instructional practice and student achievement - of authentic assessment systems (Dietel, 1993). The following are important preconditions for success:

- Utilization of outside sources of information to guide development
- The actual and perceived technical soundness of the assessment
- Public perceptions of the fairness of the assessment and its consequences
- Coordination with associated reforms
- Reasonableness of the timeline and the politics of reform
- Professional development provided to teachers (Khattri *et al.*, 1997).

It is interesting to note that teachers' professional development is identified as one of the success factors for the authentic assessment. In order to get a better understanding of the impact of the implementation of portfolios as a form of authentic assessment to

assess the student competency, it is thus worthwhile to investigate the teachers' professional needs for the use of portfolio assessment, particularly in applied learning context.

Portfolios and Competency Assessment

One of the forms of assessment that has received a notable proportion of the attention given to alternative formats is the portfolio, a tool which broadens the assessment base by embracing a wide cross section of knowledge applications formats (Burke, 1992). Such criterion-referenced assessment has been classified as authentic as it has students apply their knowledge and skills in a meaningful, real-world context.

Within that context, learning centres on students making not just receiving meaning (Brown, 1992). A large proportion of knowledge and understanding is personally and socially derived (Duit & Treagust, 1998). People are creating it all the time (Costa, 1992). In order to comprehend and assimilate new meanings, students need to embrace higher literacies where they learn how to think critically, communicate effectively, synthesise and evaluate information and become more involved in their learning than has been the case traditionally (Brown, 1992; Lazear, 2000). When students have to demonstrate their skills in observable ways they become active learners (Delisle, 1997). Portfolios are a key alternative assessment instrument as they require the demonstration of skills. They are a major part of the paradigm shift in evaluating student achievement (Klenowski, 1996).

Portfolios has been defined by Arter and Spandel (1992, p.36) as "*.. a purposeful collection of student work that tells the story of the student's efforts, progress, or achievement in (a) given area(s). This collection must include student participation in selection of portfolio content; the guidelines for selection; the criteria for judging merit; and evidence of student self-reflection.*" This definition supports the view that assessment should be continuous, capture a rich array of what students know and can do, involve realistic contexts, communicate to students and others what is valued, portray the processes by which work is accomplished, and be integrated with instructions. Later work by Arter, Spandel, and Culham (1995) reaffirmed that

definition. According to Brady (2002) the definition would be sharpened by the replacement of "purposeful" with "strategic". Clarification increases with reference to the multidimensional, continuous and ongoing characteristics of portfolios, as well as the inherent opportunities for formative and summative assessment (George, 1995).

Portfolios were introduced initially as a way for artists, graphic designers, and other such professionals to show evidence of their work, illustrating their skill at applying knowledge to practice. With education's increasing focus on performance standards and student-centered classrooms, the portfolio has become more than a repository of work samples. As an assessment tool, the portfolio must reflect both the "breadth of study envisaged by the curriculum and the quality of work that students are expected to produce" (Borthwick, 1995).

At a basic level, a portfolio contains a collection of items for assessment rather than a single piece of work. However, beyond this portfolios take various forms and have various purposes and so contain different types of materials. Moreover, the design, use and contents of portfolios reflect different conceptions about the underlying aims of the curriculum (Murphy, 1994).

Portfolios have different functions in different courses. The level of *individual student agency* in selecting work to go in the portfolios and design of their format varies widely according to portfolio type and the underlying assumptions of the curriculum. Elton and Johnston (2002) pointed out that one critical difference between portfolios is whether the portfolio is to be used as:

a) *a file (usually) of student work* (usually) produced during a course or some kind of work/professional experience. Portfolios in art and design and architecture courses are traditionally in this mode. The *individual* contents of the file may or may not have been offered up for formative and/or summative assessment before being placed in the portfolio. Each portfolio for members of a course may contain the same items to be assessed, as distinct from students selecting or producing different items. The items may have been selected by the student in which case a Type a) portfolio is becoming closer to a Type b) portfolio. Important to note is that learning may well have taken place on the course, but not necessarily as a

result of activities carried out in creation of the portfolio which has been a passive receptacle into which course products/drafts in various forms have been placed.

b) An *active learning tool* requiring analysis and review of the contents by student. In this approach, portfolios are, minimally, a tool to promote reflection. To this end, they may, as David Baume (2001) described, contain:

- *evidence* (e.g. reports, essays, designs) as it appropriate in a particular discipline. This evidence may or may not have been produced for the portfolio. It may arise out of a project or doing another part of the programme etc.
- *labelling, signposting, structuring of the evidence*
- "*critical reflection or commentary*, very probably written especially for the portfolio .. which contextualises the evidence ... makes sense of the evidence" (p.5-7).

Baume and Yorke (2002) argue that:

> ... a portfolio typically includes evidence drawn from practice. Crucially, it usually also contains reflective commentary ... in which the course participant show how he/she has interrogated his/her experience and related his/her practice and understandings to cognate evidence from the literature and elsewhere. It is typically expected that the portfolio will be scholarly, and that insights will go beyond a quotidian pragmatism to connect with the relevant theoretical constructs (in press).

Some have suggested that portfolio construction should also require student participation in the assessment process (e.g. Paulson, Paulson, & Meyer 1991; Tierney *et al.*, 1991). They argue that students should be involved in:

- establishing guidelines for what the contents should be
- selecting materials for inclusion in the portfolio
- establishing criteria for the assessment.

In such a case, as well as promoting reflection in the students, portfolios

- "become personal collections of educational experiences over a period of time"
- provide a very active means whereby students can participate in their own assessment
- "provide a more equitable and sensitive portrait of what students know, and are able to do, than do traditional assessments" (Snadden & Thomas, 1998, p.193).

In both cases a) and b), the portfolios may be offered up for formative and/or summative assessment (or potentially neither). The assessment may involve the person who produced the portfolio and/or peers and/or tutors and/or employers.

Many educational programmes in vocational education settings have been using portfolios as a means for gathering evidence for the acquisition of competencies. Research shows that portfolios are mostly used for formative purposes to foster reflection (e.g. Wade & Yarbrough, 1996; Borko et al., 1997; Smith & Tillema, 2000). Segers, Gijbels, and Thurlings (2008) also defines portfolio as a purposeful collection of examples of learning collected to give visible and detailed evidence of a person's attainment of competency. The portfolio serves primarily as a tool to highlight progression in competency development as it is under the control and responsibility of the students who presents the evidence.

Recent researchers have attempted to investigate the relationship between portfolios and competency assessment. Sluijsmans, Straetmans, and van Merrienboer (2008) attempted to describe how competence-based learning can be organised in vocational education by integrating elements from a holistic instructional design models with portfolio. A new approach named Protocol Portfolio Scoring was introduced for the design of integrative learning assessment tasks. It was reported that with the use of portfolios, students are expected to experience the assessment situation as more supportive for their development than in teacher-controlled assessment situations.

Cambridge (2008) reported the use of electronic portfolios throughout the curriculum as reflective assessment at New Century College (NCC) of George Mason University. Students are asked to organize their interpretations and evidence of their learning and performance in relationship to the nine NCC (2005) competencies. However, the portfolios students created are not intended to measure whether the student has met a predefined set of minimum standards of performance in relationship to each competency. Cambridge (2008) further concluded that use of portfolios is both more flexible than standardized testing and more easily comparable across a program than the results of authentic assessments at the course level. Besides, portfolios have the portfolios have the potential to provide multidimensional assessment data while remaining firmly grounded in the diversity of learning activities.

In the context of Applied Learning, one of the key curriculum pillars is career-related competencies which have to be assessed in an authentic or near authentic environment. Given that considerable research has been conducted to bring out the potential use of portfolios for competency assessment, yet the use of portfolios as authentic assessment method in assessing student competency in applied learning has not been researched. Specifically, in view of the important role played by teachers in using portfolio assessment, the study of the teachers' perceptions of the use of portfolios for assessing students' competency becomes important for evaluating the impact of the implementation of portfolio assessment.

Portfolio Assessment

Portfolio assessment has become widely used in educational settings as a way to examine and measure progress, by documenting the process of learning or change as it occurs. Portfolios extend beyond test scores to include substantive descriptions or examples of what the student is doing and experiencing. Fundamental to "authentic assessment" in educational theory is the principle that children and adolescents should demonstrate, rather than tell about, what they know and can do (Cole, Ryan, & Kick, 1995). Documenting progress toward higher order goals such as application of skills and synthesis of experience requires obtaining information beyond what can be

provided by standardized or norm-based tests. In "authentic assessment", information or data is collected from various sources, through multiple methods, and over multiple points in time (Shaklee, Barbour, Ambrose, & Hansford, 1997). Contents of portfolios can include drawings, photos, video or audio tapes, writing or other work samples, computer disks, and copies of standardized or program-specific tests. Data sources can include parents, staff, and other community members who know the participants or program, as well as the self-reflections of participants themselves. Portfolio assessment provides a practical strategy for systematically collecting and organizing such data.

There is a wide range of practice concerning types and purposes of portfolio assessment. In some areas such as teacher training portfolios, student independence as well as responsibility and agency in selecting and designing content of the portfolio is essential. In other cases, where portfolios are merely repositories of work done, these aspects are far less important. Students have to complete a core curriculum and are judged on the standard of the work produced, although the way they tackle each individual piece of work may vary widely.

The best portfolios have clearly delineated purposes around which tasks and assessment criteria are established. Clarification of the criteria used in determining performance and level of success is essential. Students feel empowered when the criteria are in writing, ensuring that all clearly understand and have a ready reference as to what is sought in the assessment tasks (Stenmark, 1991). Assessment tasks displayed in the portfolio must clearly illustrate effort, skill and knowledge growth and achievement over time, the core of authentic assessment (Arter & Spandel, 1992). To be broadly effective, portfolio displays need to reveal the purpose of tasks, the judgement criteria and each step of the completion or solution process.

Generally, within a portfolio, whatever the model, teachers are responsible for task creation and criteria clarification. Ideally, criteria and rationale for tasks could be written by students but once again, there is little guidance in the literature for teachers interested in such a direction. Woodward (2000) stated that clear task rationale and assessment criteria are necessary as they facilitate strong student engagement. Student involvement in generating criteria would make one of the functions of the portfolio

task instructional. It stands to reason that student generated tasks and criteria would add even greater value in seeking to build well-designed student-centred portfolios enveloped in a strong sense of learner ownership.

Advantages of Portfolio Assessment

Portfolio assessment is not teacher driven as is common in conventional assessments. In keeping with the trend toward student-centered classrooms, portfolio assessment is a shared responsibility. It requires the involvement of students, parents, and employers, as well as teachers, in establishing the assessment standards, criteria, and content of the portfolio. It affords students the opportunity to manage and monitor their learning, document their progress and achievements over time, articulate their achievement levels, and, more important, experience success.

Portfolio assessment offers teachers a way of motivating students, which is being recognized as a critical function of assessment. "A good assessment model support students' desire to learn, rather than imposing a set of demands and expectations on them, which will blight their intrinsic motivation" (Willis, 1996). Portfolio assessment motivates learning when it engages students in active learning and gives students some control over what and how they learn and how their performance will be assessed.

Well-designed, student-centred portfolios do display a rich array of what students know and can do, allowing broad evaluation (Arter & Spandel, 1992; Stenmark, 1991). Performance-based assessment of learning in portfolios presents open-ended challenges in which students can demonstrate their understanding and skills (Baker & O'Neil, 1994; Black 1995). They reflect the contexts and processes whereby students produce their work. Judgement of performance in context using explicit criteria is an acclaimed strength of the portfolio. They align assessment with what is of lasting value by way of specific useful learning goals and offer continuous feedback on student progress. Within the process portfolio, higher order skills could be revealed and judged through a wide variety of authentic open-ended tasks. They could be designed to encourage students to reflect upon that growth, an activity claimed as

crucial in bringing about deep and lasting understanding. It is clear that they have marked potential to use assessment as both learning tool and monitor by collecting continuous diverse authentic evidence of learning (Burke, Fogarty & Belgrad, 1996; Loef *et al.*, 2002). It appears that by incorporating all facets of the learning process, process portfolios could be used to align teaching, learning and assessment. In order for the teachers at the school involved in the study to develop a process portfolio, engaging their students in both the design and functioning processes, the lack of practical guidance available through the literature needed to be addressed through applied research by the teachers involved in the transition.

Portfolio assessment extends the basis of assessment beyond the "conventional" or multiple-choice category to the "alternative" assessment of active learning based on clearly defined standards (Willis, 1996). The appeal of portfolio assessment is its response to integrated curriculum. For example, the portfolio contents may include examples, reviews, and other demonstrations of students' vocational skills as well as academic achievements evidenced through multiple types of assessment, e.g., performance, process, and product assessments. It offers teachers "vital information for diagnosing students' strengths and weaknesses to help them improve their performance" (Borthwick, 1995).

Portfolios are essentially different from other forms of assessment in that they make it possible to document the unfolding process of teaching and learning over time (Wolf, 1991). They are a dynamic ongoing assessment that aids in stimulating thinking and promoting student independence. The use of portfolio-based assessment allows students to reflect, evaluate, and set future learning goals by thoughtfully selecting samples from different areas to be included (Tierney, 1992). Implementation of such authentic assessments allows parents, teacher, administrators, students, and other stakeholders to be provided with directly observable products and understandable evidence concerning student performance (Widgeons, 1990).

Student involvement in the portfolios through the design and completion of assessment tasks, the design and use of the criteria by which the work will be judged and post-task reflection is vital (Arter, Spandel & Culham, 1995). Klenowski (11996) claimed that if students are encouraged and guided in acquiring skills to evaluate their

work, and that of peers, they are using and expanding their powers of interpretation and judgement.

In considering the feasibility of portfolios as an assessment and reporting tool, thought must be given to achieving a balance between purpose and the time required to develop an effective balanced portfolio design, as well as the skills required by the teachers to compete and perfect the design process (McMillan, 2000).

An important factor for consideration within a balanced portfolio is a validity of the artefacts displayed in relation to a portrayal of the student's achievements. The concept of validity needs to be fully understood by teacher change agents (McMillan, 2000). If the portfolio process is to be valid it must be part of an assessment structure that fundamentally supports the needs of the learners (Wiggins, 1990). Results of assessments need to be supportable through valid student-generated evidence. Thought must also be given to the place of testing within the display. Questions over the validity of portfolio inclusions and conclusions drawn using judgement criteria permeate the argument facing teachers over authentic assessment (Arter, Spandel & Culham, 1995).

The literature states that criteria must be carefully tailored so as to be the most suitable for examining what was accomplished (Parke *et al.*, 2003). It also warns that validity and balanced in portfolio assessment requires the inclusion of a wide range of tasks that examine a broad breath of skills with string rigour (Black, 1995).

Portfolios seem to be well suited to the needs of authentic assessment. Darling-Hammond and Snyder (2000) identified four aspects of "authentic" assessment which seem likely to be important for assessing teaching and enhancing candidates' abilities to teach well. Although they are speaking about teacher training, the points they make about assessment are applicable to many other types of professional practice. Also, although they are speaking about authentic assessment in general, their remarks could certainly be applied to portfolios as a form of authentic assessment. Darling-Hammond and Snyder (2000) further suggested that it is important that:

1. Assessments sample the actual knowledge, skills, and dispositions desired of teachers [professionals] as they are used in teaching and learning contexts, rather than relying on more remote proxies such as examinations.
2. Assessments require the integration of multiple kinds of knowledge and skill as they are used in practice.
3. Multiple sources of evidence are collected over time and in diverse contexts.
4. Assessment evidence is evaluated by individuals with relevant expertise against criteria that matter for performance in the field.

Assessment offers the opportunity to learn and practice "the desired outcomes and for feedback and reflection" (p.527-8). Portfolio assessment seems to offer these opportunities. Cooper and Love (2002) further confirmed that portfolios are well suited to authentic learning environments.

Problems Encountered in the Portfolio Assessment

Research studies found a variety of problems, frequently alongside positive findings about portfolios (McLean & Bullard, 2000; Wade & Yarborough, 1996; Snadden & Thomas, 1998). Some of these problems seemed to relate to inadequate preparation on the part of the portfolio assessors and/or an over-free hand for the students. Some students were unclear about what expected of them. They sometimes lacked models and previous experience of portfolios and became very worried about the nature of the task (Darling, 2001). Wade and Yarborough (1996) pointed out, such initial worry is natural and probably indicative of personal growth, but continuing anxiety is likely to be a sign that the process is not working.

Darling-Hammond and Snyder (2000) mentioned that students seemed to become rather pre-occupied with producing an exciting and novel portfolio, rather than the everyday hard work and reflection that presumably most portfolios in this setting should consist of. Darling-Hammond and Snyder then argued that is important that assessors be expert and aware enough to assess whether they are being presented with solid evidence about teaching experiences and capacities or a public relations exercise.

Wagner (1998) summarized views from assessors that portfolios were rated as "a fairly time consuming" assessment method for the assessor due to the need to view each portfolio separately with its own specific evidence and then for the assessor to make a judgement. It was difficult for assessors to build up a momentum of marking speed because of the individual nature of each assessment.

Wagner (1998) also highlighted that all teachers recommended the use of marking guides with written criteria for portfolios. These can be developed for the whole class by the teacher or individually by the student to match the learning outcomes. Two types of guides appeared to be in use: holistic marking guides which give guidelines, and checklists of criteria. Holistic guides encouraged the teachers to assess 'globally' but did not offer much assistance to the novice assessor. Checklists were easier to use but made teachers operate too atomistically with the assessment. Teachers felt that marking guides helped them to achieve consistency for themselves and also across assessors. Marking guides also assisted them to keep on track and to remember to look for certain types of evidence.

McLean and Bullard (2000) argued that students found portfolio assessment hard to become reflective. The researchers concluded that either the course needed adjustment or that it was not long enough for the students to develop their reflective capacities. They also found that the students had difficulties in putting their ideas into practice. One should probably not blame the nature of portfolios and formative assessment for this. Rather these processes are complex and control over them probably takes a long time to achieve. In some cases, environments may just not be conducive to reflection developing.

Other major issues regarding the difficulty of using of portfolio assessment are related to reliability (Stecher *et al.*, 1996). Problems in scoring emerge when the portfolios contain different pieces and have diverse purposes. Lack of standardization in the way portfolio entries are produced and the amount of assistance students received present another assessment problem. Competency interpretation poses another problem of portfolio assessment in that "portfolios constructed of 'best pieces' may not reflect sustainable levels of performance under normal conditions" (Stecher *et al.*, 1996). Also of significance is that teachers may not be equipped to conduct effective

portfolio assessments without staff development training and time to collaborate with other instructors to develop portfolio rating criteria.

Apparently, without clear and explicit criteria for the assessment of the portfolio, it gives a worse result than does traditional assessment practice. Undoubtedly, the criteria should give a glimpse of what will be valued; who will assess; and how the assessment is carried out. In classroom portfolios, the criteria of selecting individual entries should be such clear that it should address the quality of individual entries, amount of information included, variety of the things included, quality of depth of self-reflection, growth in performance (Arter & Spandel, 1992) and changing mathematical disposition. Similarly, Lambdin and Walker (1994) suggest some thinking questions that serve as the criteria for portfolio assessment, which helps assess the self-reflection and self-assessment of the student. Furthermore, the judgment of self-reflection can be assessed on the basis of thoughtfulness, accuracy, realistic writing in relation to performed task, synthesis of ideas, and self-revelation (Arter & Spandel, 1992).

Portfolio Assessment and Attitudinal Change

Although the literature reviews that the use of portfolios has considerable advantages as well as problems, it is important to investigate the impact of portfolio assessment on learners' attitudinal change as it is the major purpose for the introduction of applied learning to senior secondary students - to cope with their particular needs, aptitudes and interests (EMB, 2006).

A study conducted by Barootchi and Keshavarz (2002) on portfolio assessment concluded that portfolio assessment not only contributed to learners' achievement but enhanced students' feeling of responsibility for monitoring their own progress. The attitude change reported is particularly important for the consideration of the introduction of portfolio assessment. Another study carried by Segers, Gijbels and Thurlings (2008) provided further evidence on students' perceptions on portfolio assessment. The results indicate that, when implementing portfolio assessment, feedback was essential. This implies the importance of teachers encouraging students

to make explicit how they used to reorient, or reshape, their learning activities. It is also an essential record of how portfolio assessment changes the learners' attitude.

Davis, Ponnamperuma, and Ker (2009) also found that students perceived that portfolio building heightened their understanding of the exit learning outcomes and enabled reflections. The students were initially negative towards portfolios but their attitudes became more positive after several years of evolution of the portfolio assessment process.

Although many schools implement portfolio assessment to enhance students' learning, to date evidence to support the effectiveness of portfolio assessment on attitudinal change is scare. Particularly, with the main purpose of the introduction of applied learning for senior secondary students, future research should focus on validating the results in applied learning context.

Teachers' Role in Using Portfolio Assessment for Applied Learning

The introduction of applied learning course leads to concern that there may be insufficient qualified teachers for applied learning (EMB, 2006). Qualified teachers and teaching resources are necessary to meet demands of applied learning courses and ensure that applied learning is a real option of the New Senior Secondary curriculum. As there are three modes of applied learning implementation for piloting, qualified teachers may include teachers from the secondary and tertiary education sectors, and practitioners active in the industry, the professions or commercial endeavours.

The proposed framework for professional development of COS teachers focuses on five dimensions for the successful delivery of applied learning courses (EMB, 2006). The corresponding required professional development for every dimension is outlined in Table 2.4.

Table 2.4 The five dimensions for the successful delivery of COS courses (EMB, 2006)

Dimension	Required Professional Development/ Work Experience
A. Understanding of Students and their Needs	Pedagogical knowledge and skills applied to teenage children and young adults
B. Command of Teaching and Facilitating Skills	
C. Command of Subject Knowledge and Skills	Training in a subject discipline (which may relate to one or more of the six areas of studies)
D. Positive Attitude	Not reflected by paper qualifications, but by the inclinations of teachers and the cultivation of positive attitude
E. Authentic Experience	Work/Trade experience

EMB (2006) presented the result of a survey which reflects that there is an urgent need to put in a framework for professional development and training programmes for teachers to better understand their students and their needs, and to enable them to effectively teach and guide students.

The implementation of the piloting of applied learning courses in the secondary schools has been a difficult one. It has involved changes in the relationship between students, parents, teachers, secondary schools and course providers, particularly in the introduction of competency standards as the basis for applied learning curriculum, in the way in which curriculum is developed, and in the way in which curriculum is delivered and assessed. It can be argued, however, that the greatest effects have been upon applied learning teachers, since they have had to change their everyday practice to accommodate applied leaning. Moreover, they hold the ultimate responsibility for ensuring that applied learning achieves the stated desired outcomes.

Brown *et al.* (1997) claimed that the change of methods of assessment is powerful tool for the change of student learning. Elton and Johnston (2002) added that if one

changes the method of teaching, but keeps the assessment unchanged, one is very likely to fail. As portfolios can provide a showcase of students' abilities, talents, interests and potentials (Barootchi & Keshavarz, 2002), this assessment procedure has the potential to provide valuable information concerning students' performance in educational settings. Information gathered through portfolio procedures coupled with information gathered by means of standardized assessment measures can better equip students, parents and professionals in making informed decisions regarding educational goals and instructional objectives.

In relation to the assessment of individual tasks, Kerka (1995) stated that there are multiple dimensions to the subjective evaluation of portfolio tasks, as against impersonal objective, traditional testing. The teachers' involved needed exposure to all dimensions of portfolio assessment as each facet had a potentially significant importance in providing fair and valuable feedback to learners. Brualdi (1998) also warned that implementing teachers needed to become aware of and address stakeholders' concerns as to the accuracy of the evaluation of portfolio content and the communication of those judgements.

Teachers, the final assessors of students' artifacts, require quality in-depth training in making sound judgements, as their responses are the concluding assertions as to the quality of student performance. Teachers' knowledge of content, expectations and experience, will influence those judgements (Baker & O'Neil, 1994). Teachers need the knowledge and skills that allow them to tap into all available sources of data in order to form balanced opinions as to student progress (Lidstone, 1991). With the literature confirming the general short-fall in teachers' data collection skills, it was clear that assessment change demanded pertinent teacher professional development.

The fundamental core of complex assessment solutions is judgement criteria (McMillan, 2000). Substantial emphasis needs to be placed on development of the skills utilized in writing criteria and in helping students reflect upon and learn from experiences. While the introduction of portfolio assessment in applied learning is an attempt to improve the teaching and learning, teachers needed time to explore the possibilities of portfolios. It is foreseen that time devoted to such exploration would lead to models suited to applied learning context.

Within the context, assessing the merit of student-generated tasks and making appropriate responses to students' self-assessments and reflections were other skills needed. Rudner (1992) stated that training teachers as feedback providers is crucial, as training can reduce distortions brought about through perceptual differences and leniency or stringency errors. It can also diminish the hesitancy of some to introduce portfolios through feeling that they do not know enough about assessing performance in a more subjective manner (Brualdi, 1998). With literature having exposed many of the demands upon the profession, the teachers needed to accept the challenge and grapple with assessment change to meet the emerging need.

Teacher Professional Development

Teacher development is the professional growth a teacher achieves as a result of gaining increased experience and examining his or her teaching systematically (Glatthorn, 1995). Professional development includes formal experiences (such as attending workshops and professional meetings, mentoring, etc.) and informal experiences (such as reading professional publications, watching television documentaries related to an academic discipline, etc.) (Ganser, 2000). Ganser (2000) further pointed out that when looking at professional development, one must examine the content of the experiences, the processes by which the professional development will occur, and the contexts in which it will take place.

Evidence shows that professional development has an impact on teachers' beliefs and behavior (Frankes *et al.*, 1997; Thompson, 1992). Besides this impact, a number of studies reported that the more professional knowledge teachers have, the higher levels of student achievement (Tatto, 1999; Falk, 2001; Grosso de Leon, 2001). Borko and Putnam (115) offered evidence to support the fact that professional development plays an important role in changing teachers' teaching methods, and that these changes have a positive impact on students' learning.

Evidences from literature also show that the professional development of teachers is a key factor in ensuing that changes or reforms are effective (Darling-Hammond &

McLaughlin, 1995; Schifter, Russell, & Bastable, 1999; Wideen, 1992). Futrell *et al.* (1995) identified that including teachers and their professional development as part of the reform will lead to a higher likelihood that reform will be successful. Darling-Hammond and McLaughlin (1995) opinioned that in order to allow professional development to play an effective part in educational reform, polices must be supportive of the changes that teachers are asked to make.

While the objective of the portfolio assessment implementation is to increase students' learning and to improve their performance, the professional development of teachers should be considered a key factor.

Summary

While the development of applied learning course aims at enabling students to understand fundamental theories and concepts through applications and practices, the student's competency is recommended to be assessed in authentic contexts (EMB, 2006). Multimedia, as a new discipline of study in local education, has been introduced as one of the piloting courses since 2003 to senior secondary students in order to provide students with basic knowledge and practical skills in developing multimedia products.

After reviewing the literature, the definition of competency and the importance of assessment for students in the learning process and for achieving academic success has been researched and documented. The research has shown that there has been a substantial move in most western countries, such as the United States, Great Britain and Australia to develop a series of truly generic competencies. Key competencies were also developed to detail the necessary skills and attributes all young people should have on entering the workplace. They were to be incorporated into education and training programs operating in sectors other than the VET sector – that is, the secondary and higher education sectors. The Industry Training Advisory Committees in Hong Kong are also actively developing the Specification of Competency Standards for their respective industries in order to set out the competency standards required at different levels under the Qualification Framework which was established

in 2004 to facilitate articulation among academic, vocational and continuing education.

Research studies further (Wolf, 1989; Gonczi, 1993) point out that competency is better assessed under a performance-based assessment system which assessors will judge from evidence based on performance whether an individual meets criteria specified in competency standards. The benefits of this approach are the ability to identify learning needs, provide insight into areas of professional practice and allocate educational resources for training. The use of competency statements can also facilitate self-directed, individualized learning by enabling practitioners to reflect on their current practice. Compared with the traditional approach to assessment of practice, the authentic or performance-based approach is potentially more valid. It comes closer to assessing what we want to assess, which is the capacity of the professional to integrate knowledge, values, attitudes and skills in the world of practice (Gonczi 1994).

Portfolios and other types of authentic assessment are considered appropriate forms of assessment in authentic contexts. From the review of literature it is also evident that this type of assessment can motivate learning when it engages students in active learning and gives students some control over what and how they learn and how their performance will be assessed. However, it is apparent that further research is needed to explore the impact of the use of portfolio assessment on the learner's achievement. This study attempts to scrutinize whether portfolio assessment contributes to learners' achievement and the changes in attitude and behaviour of the students.

A further review of literature on the teachers' role in using portfolios for assessment exposes those issues confronting teachers as they attempt to realign their teaching and learning programs in order to embrace assessment of competency through portfolios. Evidences from literature also show that the professional development of teachers is a key factor in ensuing that changes or reforms are effective. Particularly, successful professional development opportunities for teachers have a significant positive effect on students' performance and learning. It is thus also the aim of this study to investigate the use of portfolios as a means of assessing the competency in authentic contexts and the professional development needs of teacher in portfolio

implementation.

By looking into the impact of the implementation of portfolio assessment as an authentic assessment method in the applied learning of multimedia course from both students' and teachers' perspectives, it is hoped that the findings will provide implications on how and why portfolio assessment can be integrated into the Hong Kong Applied Learning curriculum and assessment framework. The research design and methodology of the study are discussed in the next chapter.

CHAPTER THREE

METHODOLOGY

The applied learning of multimedia course Creative Multimedia Studies has been introduced into the senior secondary schooling in Hong Kong since the first piloting of applied learning course in 2003. With a view to improve the curriculum and assessment of the programme to cope with the development of applied learning courses, portfolios have been introduced as a form of authentic assessment of competency starting since the 2007-09 cohort. Every student is required to produce his/her own portfolios which document his/her experience of multimedia appreciation, in particular, the ability of the student to identify the key areas or themes that underpin a multimedia product and define the creative angle that may add impact to it. The competency of the students in multimedia literacy and critics will be assessed based on their collections and comments in various real world multimedia products included in the portfolio.

This research study first compared the students' achievement and learning attitude for the two cohorts of students with and without portfolio assessment. The second part of the study then explored the impact of the portfolio implementation by investigating the teachers' perceptions and their professional development needs for the use of portfolios to assess students' competency.

Research Questions

As this study focused on investigating the impact of the implementation of portfolios as a form of authentic assessment to assess the competency of the students in multimedia literacy and critics in an applied learning of multimedia course from both students' and teachers' perspectives, the aims of the study were to:

1. Compare the achievement of students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment.

2. Compare the students' satisfaction of the applied learning course with portfolio assessments to satisfaction of students enrolled in the same course without portfolio assessment.

3. Investigate the teachers' perceptions of the use of portfolios as a means of assessment of the students' competency.

4. Investigate the teachers' professional development needs for the use of portfolio assessment in applied learning.

Particularly, the study was to answer the following research questions:

1. Does the use of portfolio assessment contribute to applied learner's achievement?

2. Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?

3. To what extent have portfolios provided a means of assessment of the students' competency?

4. What are current and future professional development needs of teachers using portfolio assessment in applied learning?

Research Design

Research design is governed by the notion of "fitness for purpose". The purposes of the research determine the methodology and design of the research. (Cohen, Manion and Morrison, 2004, p.73). Cohen *et al.* (2004) identify eight main styles of educational research:

1. Naturalistic and ethnographic research
2. Historical research
3. Surveys, longitudinal, cross-sectional and trend studies
4. Case studies
5. Correlational research
6. *Ex post facto* research
7. Experiments, quasi-experiments and single-case research
8. Action research

As this study seeks to explore the impact and the subsequent implications of the implementation of portfolio assessment as an alternative assessment method in the applied learning multimedia course from both students' and teachers' perspective, issues related to the subjects of the study, i.e. students studying the applied learning course and teachers teaching the course, need to be addressed. As there are about 250 to 300 students studying the applied learning course in each cohort, it would be relatively viable to conduct quantitative analysis with positivistic approach. On the other hand, the small number, less than 10, of teachers involved in the teaching of the applied learning does impose limitation for the study.

The research design for this study was formulated based on the purposes, the nature of the research questions, and the available resources. Because this study has to answer questions of what is the improvement of the students' achievement, what are the changes in learning attitude and satisfaction of the participants, what are the needs of professional development of teachers using portfolio assessment in applied learning, and how can portfolios provide evidence of the students' competency, a mixed-methods methodology using both quantitative and qualitative methods were selected to implement the study.

While quantitative researchers have a positivistic perspective on educational research and believe that human behaviour is governed by general universal laws, qualitative researchers have an interpretive perspective in which human behaviour is seen as socially dependent and context related. According to Pring (2000) a "false dualism" has been created between positivists and interpretivists. The differences between the

two paradigms have been exaggerated and opposition between quantitative and qualitative research is wrong. Differences in epistemological assumptions should not keep an interpretivist from using quantitative methods and a positivist from using qualitative methods. The qualitative and quantitative debate had a catalytic role in moving beyond the dichotomy of qualitative and quantitative research and in developing a new approach called mixed-methods research.

Some definitions of mixed-methods research are provided as follows:

- Mixed methods design is the incorporation of various qualitative and quantitative strategies within a single project that may have either a qualitative or quantitative theoretical drive. The "imported" strategies are supplemental to the major or core method and serve to enlighten or provide clues that are followed up within the core method (Morse, 2003, p.190).

- Mixed methods research is research that involves collecting, analysing, and integrating both quantitative and qualitative data in a single study or in multiple studies in a sustained program of inquiry (Cresswell *et al.*, 2002, p.3).

Patton (1990) states quantitative and qualitative methods involve differing strengths and weaknesses and constitute alternative, but not mutually exclusive, strategies for research. Both can therefore be used in the same study. (p. 14) Tashakkori and Teddlie utilized the phrase "the dictatorship of the research question, not the method" (1998, p. 20) to stress what is important in framing a study. They argued that the method is secondary to the research question itself. Datta (1994) has also given five practical reasons for using both methodologies:

- Both methodologies have been used for years
- Many evaluators and researchers have urged using both paradigms
- Funding agencies have supported both paradigms
- Both paradigms have influenced policy
- Much has been taught by both paradigms

Brewer and Hunter (1989) concur with Datta (1994) and Patton (1990): The pragmatism of employing multiple research methods to study the same general problem by posing different specific questions has some pragmatic implications for social theory. Rather than being wed to a particular theoretical style and its most compatible method, one might instead combine methods that would encourage or even require integration of different theoretical perspectives to interpret the data. (p. 74)

Summarizing the above the use of a mixed-methods approach in this study could be justified by a number of reasons. First, integrating qualitative and quantitative data can provide strong evidence for conclusions, and provide better inferences (Cresswell, 2003). The results from the qualitative data can help to understand better the statistical findings. Second, triangulating the data from different methods increases the validity of the results and the conclusions. Finally, the strength of one method can be used to compensate the deficits of another method.

The paradigm that underpins the study with students is mainly positivistic. With the introduction of the portfolio assessment in the applied learning course starting from 2007-09 cohort, experimental research can be carried out to explore the impact of the portfolio assessment on students' achievement and attitude with comparison with students of 2006-08 cohort. A quasi experimental design is thus adopted as it is impossible to have identical group of students in two cohorts to serve as control. Where matching is not possible, the researcher is advised to use samples from the same population or samples that are alike as possible (Kerlinger, 1970).

The cohort of students with portfolio assessment (2007-09) is considered as the experimental group and the other cohort without portfolio assessment (2006-08) as the control group. In order to check the homogeneity of the two groups, a survey questionnaire is designed to elicit information on the demographic profile of the students and on their motivation for learning multimedia.

In light of the limited number of teachers involved in the study, the paradigm that underpins the study with teachers is interpretive. Interpretive research approach gives the researcher greater scope to address issues of influence and impact, and to ask

questions such as "why" and "how" particular technological trajectories are created (Orlikowski and Baroudi 1991).

Particularly, the learners' attitude, teachers' needs of professional development and evidence of students' competency can best be understood when observed in the context of their actions. This belief about the human behaviour is consistent with the characteristics of the interpretive paradigm of research according to which:

> humans actively construct their own meanings of situations; meaning arises out of social situations and it is handled through interpretive processes; behaviour and, thereby, data are socially situated, context-related, context-dependent and context-rich (Cohen, Manion and Morrison, 2004, p.137).

Interpretive research assumes that "our knowledge of reality is gained only through social constructions such as languages, consciousness, shared meanings, documents, tools, and other artifacts" (Klein and Myers 1999, p. 69). Interpretive research does not predefine dependent or independent variables and it attempts to explain phenomena through the meanings that people assign to them (Orlikowski and Baroudi 1991).

Subjects of the Study

This study collected data from both students and teachers in order to answer the research questions concerning students and teachers respectively. To facilitate the data collection and presentation, the study was divided into two parts. The first part of the study dealt with data from the students while the second part of the study focused on data collection from the teachers concerned.

The first part of the study focused on the students and the subjects of the study were the entire class of the applied learning course "Creative Multimedia Studies" of 2006-08 cohort (n =300) and 2007-09 cohort (n=250). The course has been offering by the Department of Multimedia and Internet Technology, Hong Kong Institute of Vocational Education (Tsing Yi) since 2003. Participants of the classes were

secondary students of Form 4 class and they came from different secondary schools in Hong Kong. These students are around 15 to 16 years of age.

The second part of the study focused on the teachers and the subjects of the study were the teachers (n=10) who had taught the 2006-08 and 2007-09 cohorts of the applied learning course Creative Multimedia Studies. Participants included male and female teachers who taught the Module I of the applied learning course. This group of subjects consisted of teacher of secondary school and lecturer/teaching associate of Hong Kong Institute of Vocational Education (IVE).

Methods of Data Collection

Upcraft and Schuh (1996) suggest that quantitative studies "give us a very firm foundation for describing and analyzing what 'is', and offer some insight into 'why' it is the way it is" (p.85). The first and second research questions in this study are quantitative in nature and they asked

- Does the use of portfolio assessment contribute to applied learner's achievement?

- Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?

While the purpose of this analysis was to ascertain the differences in achievement between students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment, any such assessment needed to call into account the possibility that the two groups of students might differ in regards to other factors as well....factors that might, in turn, affect their performance.

In order to carry out the study, all students of the two cohorts were selected. The cohort of students with portfolio assessment was considered as the experimental group and the other cohort without portfolio assessment as the control group. In

order to check the homogeneity of the two groups, a questionnaire was designed to elicit information on demographics of the students and on their motivation of learning multimedia. A two-sample t-test between proportions was performed to determine whether there was a significant difference between 2006-08 cohort and 2007-09 cohort with respect to the learning motivation.

Although the applied learning multimedia course consists of three modules, only the first module is designed to be assessed by portfolio starting from 2007-09 cohort. Consequently, for the experimental group portfolios will be used as an assessment tool to assess the learning objectives of the first module of the course while the assessment of achievement for the control group will be through tests. The assessments of the second and third modules will be the same for the two groups.

The assessment tasks used in the portfolio assessment are the development of portfolios in order to assess the students' competency in the expression of appreciation and criticism of the production of three different types of multimedia product - computer game, computer animation and visual effects, in local digital entertainment industry. When preparing portfolios related to each type of multimedia products, students were asked to research and select one of their favorite products in real life and to response why the product is valuable to them. They had to comment professionally about the character design, story or game design, techniques about the production of the product selected. Responses could be recorded as writing, annotations, and/or graphics; this was personal choice for the individual student.

The students were then be asked to use their creativity to re-design the product. They had to provide evidence in idea generation and concept development. The tasks required the learners to work on their own and they are devised to provide evidence of the learners' ability to identify the key areas or themes that underpin a multimedia product and define the creative angle that may add impact to it. The learners had to publish their portfolios online such that they had opportunities to reflect on their own work, as well as those of their classmates. At specific time they were advised by the teacher to review others ideas and noting strengths and less successful aspects, in addition to doing this for their own work.

For preparing portfolios a number of relevant goals based on the learning objectives and those claimed to be achieved by portfolio assessment will be combined. On the basis of these goals, grading checklists were drawn up, to be used by the raters to achieve inter-rater reliability. To the extent the work provided by students matched each criterion considered in the checklists, grades from Very Good (5) to Poor (1) was assigned. The portfolio contents included core and optional items, and both written and recorded tasks, selected by the students to display their best work. Reflective comments on aspects of learning demonstrated by each piece of work were requested to be attached.

The study utilized quantitative research methods to answer precisely what students in the cohort of applied learning course with and without portfolio assessment achieved, and if any statistical differences existed between the two groups.

Finally, a satisfaction questionnaire was designed to study the attitude of participants towards their learning experiences of Module I. They were asked to take a few minutes of their time to choose the responses which best described their opinion in relation to the applied learning course they had taken. A 8-item close-ended questionnaire was designed to elicit students' learning experience on Module I of the course. The questions were derived from the course end survey (see Appendix A) which has been used to collect feedback from all the students studying any applied learning courses offered by Vocational Training Council since the first cohort of 2003. The questionnaire used was written in both Chinese and English. Quantitative research methods were then used to check if any statistical differences existed between the two groups.

For the experimental group, the students were also asked to give feedback on their learning experience about the portfolios construction for multimedia appreciation. A 10-item close-ended questionnaire was designed to elicit students' satisfaction about the portfolio assessment. The questions were derived from previous Again, the questionnaire used was written in both Chinese and English. Data were recorded, and later transcribed and analyzed regarding the themes that emerged.

The second part of the study focused on the teachers and the participants were the

teachers who had taught the Module I of the applied learning course Creative Multimedia Studies for 2006-08 and 2007-09 cohorts. This part of the study aimed at answering the third and fourth research questions:

- To what extent have portfolios provided a means of assessment of the students' competency?

- What are current and future professional development needs of teachers using portfolio assessment in applied learning?

Quantitative research methods were used to collect data about the teacher's perceptions on the use of portfolios for assessing a student's competency in authentic contexts and their needs of professional development. Moreover, the teachers were interviewed to discuss about their feedbacks and concerns regarding a change in the assessment method introduced in the applied learning course.

The data collection process will start with the use of a questionnaire. According to the interpretive research paradigm teachers construct their subject knowledge based on their beliefs and experiences with the subject and its teaching. Thus, the aim of the questionnaire is to collect information on participants' experiences with competency-based assessment, their beliefs about the use of portfolios for assessing competency, and their needs of professional development. The questionnaire was divided into three sections. The first section aimed to elicit information on demographics and on participants' experiences with competency-based assessment. The second section gathered information on participants' beliefs about the use of portfolios as a means of assessing the students' competency. This part included the use of questions asking for degree of agreement (five point Likert scale) on statements related to beliefs about the use of portfolios. Open end questions were asked to allow teachers to give additional comments or opinions. Finally, the third part included questions asking for degree of importance (five point Likert scale) on statements related to needs of participants' professional development for using portfolios for assessing competency in applied learning of multimedia. Open end questions were also asked for additional comments.

The use of a questionnaire, in the format that is described above, has a number of advantages. First, it presents all respondents with identical items providing a high level of comparability among the respondents. Second, it can be administered to a representative sample and this, in turn, means that statements on teachers' beliefs and needs of professional development are more likely to be generalized. However, the closed format of the questions can determine the depth of the participants' beliefs about the use of portfolios and its teaching only to an extent. The closed questions do not say much of what the respondents mean when agreeing with a statement related to their beliefs about the nature of portfolio assessment. Also, the audit items do not say much about how the participants thought in order to give a correct or an incorrect answer. Here the interview data can fill out what is learned from the questionnaire.

Interviews are used to gather information regarding an individual's experiences and knowledge; his or her opinions; beliefs, and feelings; and demographic data. Interview question can be asked "*to determine past or current information as well as predictions for the future*" (Best & Kahn, 1998, p.255). While interviewing is basically about asking questions and obtaining answers, much has to be considered before a decision is made as to what are the most appropriate methods for one's study.

For this study, in-depth semi-structured interview was chosen. The respondents were asked a series of pre-established questions which were all open-ended with no pre-set response categories. As the purpose of the interviews was to further explain and interpret the findings from the questionnaire survey, the interview questions were developed from the questions included in the survey. The questions being open-ended allowed the respondents to elaborate more on their opinions, beliefs and experiences on the issues raised and this made possible the expansion of the data gathered from the survey. All the teachers who completed the questionnaire survey were invited to attend the interview. As all interviews were carried out by only one interviewer, the researcher himself, so that issues of interviewer bias or effects were eliminated.

The follow up interview with teachers was divided into two parts. The first part aimed to clarify respondents' answers to the questionnaire items. Particularly, the interviewees had the opportunity to expand their ideas, explained their views and their way of thinking as these were shown in their responses to the questionnaire items.

This discussion helped to understand better, and complement the results from the analysis of the questionnaire. Also, combining the data from the questionnaires and the interviews will strengthen the inferences that will be drawn from the statistical analysis of the quantitative data. Finally, an assumption, that is consistent with the interpretive research paradigm, is that participants' responses to the questionnaire items are based on how they interpret the questions. The interview is a way of increasing the validity of the questionnaire data by checking that the participants interpret in the same way the questionnaire items. Therefore, these strengths of the use of interviews were used to overcome the weaknesses in the use of a questionnaire.

The aim of the second part of the interview was to gather information on how the interviewees use various aspects of their pedagogical knowledge in taking decisions about portfolio assessment. The study addressed this issue by the use of hypothetical scenarios that represent real classroom situations which every teacher could encounter while teaching. The interview tasks provided information on both what teachers know and believe about portfolio assessment and on what aspects of their knowledge and skills they draw on in taking teaching decisions. Interview guide questions which were developed from the questions included in the survey were used to further collect data about the participants' feedbacks and concerns regarding the assessment method introduced in the applied learning course.

The combination of the above two methods of data collections – questionnaire and interviews with teachers were primarily used by the study to find out the teachers' perceptions of the use of portfolios as a means of assessment of the students' competency, and to identify the teachers' professional development needs for the use of portfolio assessment in applied learning.

Summary

This chapter consists of the importance of analyzing philosophical aspects of the studies and its implications for the selection of the data collection methods. Particularly, its focus is on the appropriateness of using the mixed-methods methodology, within an interpretive research paradigm, for investigating the impact of

introducing the use of portfolios in assessing competency in applied learning of multimedia.

While the first part of the study focused on the students and the subjects of the study were the entire class of the applied learning course Creative Multimedia Studies of 2006-08 cohort (n =300) and 2007-09 cohort (n=250), quantitative methods were recommended to use for comparing the achievement of students participating in the applied learning with portfolio assessment to students enrolled in the same course without portfolio assessment. Moreover, questionnaire survey was recommended to conduct in order to identify learning experience and attitude towards the portfolio assessment by the students who had taken the course.

The second part of the study focused on the teachers and the participants were the teachers who had taught the Module I of the applied learning course Creative Multimedia Studies for 2006-08 and 2007-09 cohorts. Both quantitative and qualitative methods were recommended to use for exploring the applied learning teachers' belief on the use of portfolio in assessing students' competency as well as their needs for professional development of using portfolio assessment in applied learning. A questionnaire survey was first recommended to conduct in order to collect the views from the teachers while follow up interviews were recommended to further collect data about their feedbacks and concerns regarding a change in the assessment method introduced in the applied learning course.

In the next two chapters, results and findings from the two parts of the study are presented concerning the impact of the portfolio assessment on students and teachers respectively.

CHAPTER FOUR

RESULTS OF STUDY I – IMPACT OF THE PORTFOLIO ASSESSMENT ON STUDENTS

While the purpose of this study is to explore the impact of the implementation of using portfolios in assessing competency in the applied learning multimedia course from both students' and teachers' perspectives, the results of the study are also presented separately in Chapter 4 and 5. The discussion of each of its findings is followed in Chapter 6. This chapter reports the results and findings relevant to the first two research questions concerning the impact of the portfolio assessment on students' achievement and learning attitude. The next chapter will present the results and findings relevant to the other two research questions concerning the teachers' perception on the use of portfolios for assessing a student's competency and their professional development needs.

This part of the study was designed to explore the impact of the portfolio assessment on the students' achievement and learning attitude. It attempted to establish whether the use of portfolio assessment contributes to students' achievement and improve their attitude towards monitoring their learning experiences in the applied learning of multimedia course. Two cohorts of students were selected to carry out the study and data collected was to answer the following two research questions:

- Does the use of portfolio assessment contribute to applied learner's achievement?

- Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?

The participants of this part of study were all students enrolled in the piloting applied learning course Creative Multimedia Studies offered by the Department of Multimedia and Internet Technology of Hong Kong Institute of Vocational Education

(Tsing Yi) in cohort 2006-08 and 2007-09. They were Form 4 students and came from different secondary schools in Hong Kong. These students were around 14 to 17 years of age when the study took place.

The cohort of students with portfolio assessment (2007-09) was considered as the experimental group and the other cohort without portfolio assessment (2006-08) as the control group. In order to check the homogeneity of the two groups, a survey questionnaire (see Appendix B) was designed to elicit information on the demographic profile of the students and on their motivation for learning multimedia. The majority of the questions were asked to express the level of agreement of participants on the statements provided using a five-level Likert scale. The questionnaire survey was conducted at the beginning of the delivery of Module I in October 2006 and October 2007 for students of 2006-08 cohort and 2007-09 cohort respectively.

After the completion of Module I, the assessment results of the two cohorts of students were collected for comparison and analysis. It was aimed to compare the achievement of students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment. Another survey questionnaire (see Appendix C) was designed to elicit students' learning experience on the study of Module I. For the experimental group, questions were also asked to evaluate their experience on portfolio assessment. This questionnaire survey was conducted in April 2007 and March 2008 for students of 2006-08 cohort and 2007-09 cohort respectively. Analysis of data collected by the two questionnaire surveys and assessment results are included in this chapter to understand the impact of portfolio implementation on students' achievement and learning attitude.

Participants' Profile and Motivation of Learning Multimedia

Table 4.1 outlines the number of survey questionnaires distributed and the number of responses received from each of the two cohorts of students.

Table 4.1 Distribution of survey questionnaires by cohort

Cohort	Questionnaires distributed	Number of responses	Response rate
2007-09 (Experiment)	314	287	91.4%
2006-08 (Control)	319	256	80.3%

The response rates of the questionnaires for the two cohorts were both over 80%. Those who did not complete the survey were either absent or unwilling to participate. The good response rate was partly due to the fact that the five-point Likert options for responses was well understood by the 14-16 year-old students involved in the study. Besides, all the surveys were conducted during class and the students were given sufficient time to complete the questionnaire. The high response rate (n=287 for experimental group and n=256 for control group) helped to provide sufficient data for the later analysis.

Gender and age

The first section of the survey questionnaire asked the personal particulars of the participants. Participants included male and female students and the majority of the participants are male aged 14 to 17, whereas there are a very small number of those over 18. Male participants of the two cohorts make up over 70% of the total participants. Table 4.2 indicates the distribution of participants by gender.

Table 4.2 Participants by gender

2006-08 Cohort (Control)			2007-09 Cohort (Experiment)		
Gender	Frequency	Percent	Gender	Frequency	Percent
Male	200	78.1	Male	205	71.4
Female	56	21.9	Female	82	28.6
No respond	0	0.0	No respond	0	0.0
Total	256	100.0	Total	287	100.0

Table 4.3 outlines the distribution of participants by age, in which both cohorts have over 90% of students in the age group from 14 to 17.

Table 4.3 Participants by age

2006-08 Cohort (Control)			2007-09 Cohort (Experiment)		
Age	Frequency	Percent	Gender	Frequency	Percent
Under 14	3	1.2	Under 14	0	0.0
14	34	13.3	14	47	16.4
15	119	46.5	15	135	47.0
16	52	20.3	16	57	19.9
17	26	10.1	17	25	8.7
18 and over	14	5.5	18 and over	15	5.2
No response	8	3.1	No response	8	2.8
Total	256	100.0	Total	287	100.0

Profile of participants' school

Question 3 and 4 on the survey questionnaire asked the participants about their school location and medium of instruction. The majority of participants' schools are located in New Territories (NT). In both cohorts, about 60% of participants' school are in NT while the rest of participants' school are in Hong Kong Island (HK) and Kowloon. Table 4.4 outlines the geographical location of participants' school.

Table 4.4 Geographical location of participants' school

2006-08 Cohort (Control)			2007-09 Cohort (Experiment)		
School location	Frequency	Percent	School location	Frequency	Percent
Hong Kong Island (HK)	21	8.2	Hong Kong Island (HK)	52	18.1
Kowloon	76	29.7	Kowloon	58	20.2
New Territories (NT)	159	62.1	New Territories (NT)	177	61.7
Total	256	100.0	Total	287	100.0

It is noted that the majority of the participants' schools are using Chinese as medium of instruction. Both cohorts have over 95% of participants' school with Chinese as medium of instruction. Table 4.5 outlines the medium of instruction of participants' school.

Table 4.5 Medium of instruction of participants' school

2006-08 Cohort (Control)			2007-09 Cohort (Experiment)		
Medium of instruction	Frequency	Percent	Medium of instruction	Frequency	Percent
English	8	3.1	English	7	2.4
Chinese	248	96.9	Chinese	280	97.6
Total	256	100.0	Total	287	100.0

IT exposure

Question 5 and 6 on the survey questionnaire asked the participants about their exposure of IT at home with respect to the possession of personal computer and access of Internet. Table 4.6 indicates that about 95% of both cohorts of students have IT exposure at home.

Table 4.6 Participants' IT exposure at home

2006-08 Cohort (Control)			2007-09 Cohort (Experiment)		
IT exposure at home	Frequency	Percent	IT exposure at home	Frequency	Percent
With personal computer	241	94.1	With personal computer	271	94.4
With Internet access	242	94.5	With Internet access	275	95.8
Total	256		Total	287	

Students' learning motivation

The second section of the survey questionnaire asked the participants about their learning motivation on multimedia. When asked to rate 10 statements in terms of their motivation on learning multimedia, five ordered response levels were used: strongly agree, agree, neutral, disagree and strongly disagree. Summary of the responses from 2006-08 cohort and 2007-09 cohort are displayed in Table 4.7 and Table 4.8 respectively.

Table 4.7 Responses on the learning motivation of multimedia for 2006-08 cohort

No.	Statement	Number of responses	Agree to strongly agree
1	From what I know, learning multimedia is interesting	283	85.5%
2	I expect that studying multimedia will be rewarding.	287	88.5%
3	I believe my ability learning multimedia well	287	81.5%
4	I want to further study multimedia related course in post-secondary school	286	74.5%
5	I like animation	287	76.7%
6	I like computer game	283	74.9%
7	I like video or visual effects	268	50.4%
8	It has to learn different multimedia content software which is a useful tool.	265	83.0%
9	People around me encourage me to learn multimedia	269	78.1%
10	I have to obtain the award which is equivalent to a pass of HKCEE subject	267	61.0%

Table 4.8 Responses on the learning motivation of multimedia for 2007-09 cohort

No.	Statement	Number of responses	Agree to strongly agree
1	From what I know, learning multimedia is interesting	255	79.2%
2	I expect that studying multimedia will be rewarding.	256	82.8%
3	I believe my ability learning multimedia well	254	75.2%
4	I want to further study multimedia related course in post-secondary school	254	65.0%
5	I like animation	255	67.8%
6	I like computer game	255	67.1%
7	I like video or visual effects	246	47.2%
8	It has to learn different multimedia content software which is a useful tool.	245	78.0%
9	People around me encourage me to learn multimedia	244	77.5%
10	I have to obtain the award which is equivalent to a pass of HKCEE subject	245	55.9%

The findings show that most of the participants were in agreement that their learning motivation of the multimedia course were related to the *reward* (88.5% for 2006-08 cohort and 82.8% for 2007-09 cohort), *interest* (85.5% for 2006-08 cohort and 79.2% for 2007-09 cohort) and *usefulness* (83.0% for 2006-08 cohort and 78.0% for 2007-09 cohort) of the course. The results also show that the two cohorts of students rated these three important factors in the same order of priority. It is interesting to note that the formal award which is equivalent to a pass of HKCEE subject is relatively less important as learning motivation (61.0% for 2006-08 cohort and 55.9% for 2007-09 cohort). Among the three areas of study, the results also show that the two cohorts of students rated them in the same order of priority, i.e. animation, computer game and visual effects.

Analysis on students' learning motivation

A two-sample t-test between proportions was performed to determine whether there was a significant difference between 2006-08 cohort and 2007-09 cohort with respect to the top five important learning motivation. Results of the t-value computed are summarized in the following table.

Table 4.9 t-value for the top five learning motivation of the two cohorts

Statement	2006-08 Cohort (Control)		2007-09 Cohort (Experiment)		t-value	Degree of freedom
	Number of responses	Proportion of Agree	Number of responses	Proportion of Agree		
I expect that studying multimedia will be rewarding.	287	88.5%	256	82.8%	1.897	541
From what I know, learning multimedia is interesting	283	85.5%	255	79.2%	1.920	536
It has to learn different multimedia content software which is a useful tool.	265	83.0%	245	78.0%	1.443	508
I believe my ability learning multimedia well	287	81.5%	254	75.2%	1.792	539
People around me encourage me to learn multimedia	269	78.1%	244	77.5%	0.165	511

As shown in Table 4.9, all the t-values do not exceed the t-critical at 95% confidence level. Therefore, it is concluded that the difference for the top five important learning motivations between the two cohorts of students were not significant.

Homogeneity of the Two Groups of Students

From the analysis of the result of the survey questionnaire, there was no significant difference between two cohorts of students in term of gender, age, education background of school's profile, and IT exposure. The majority of students in both cohorts are male, age 14 to 17, studying at school in New Territories, with Chinese as medium of instruction, and exposure to IT at home is considered adequate.

The survey data collected for learning motivation revealed that the two cohorts of students were in agreement that their learning motivation of the multimedia course were mainly related to the *reward*, *interest* and *usefulness* of the course. These three important factors were also rated by the two cohorts of students in the same order of priority. The results from the two-sample t-test further confirmed that the difference for the top five important learning motivations between the two cohorts of students was not significant.

In conclusion, the homogeneity of the two groups of students, experimental group (2007-09 cohort) and control group (2006-08 cohort), was checked in terms of demographics of the students and on their motivation of learning multimedia. The study was then carried on to compare the two cohorts of students' achievement and learning experience in order to find out the impact of portfolio implementation.

Results of Students' Achievement

The use of portfolios for assessment has been introduced as one of the assessment components in Module I (Multimedia Fundamentals) starting from 2007-09 cohort. For the experimental group (2007-09 cohort), portfolios were used together with other continuous assessments and tests to assess the students' performance while the assessment of achievement for the control group (2006-08 cohort) was only made through continuous assessments and tests. The assessments of the second and third modules were the same for the two groups. Table 4.10 outlines the assessment scheme of the module for the two cohorts.

Table 4.10 Assessment scheme of Module I by cohort

Module	Assessment Method	2007-09 Cohort (Experiment)	2006-08 Cohort (Control)
		Percentage	Percentage
Module I (Multimedia Fundamentals)	Continuous Assessment	50%	50%
	Test	40%	50%
	Portfolio Assessment	10%	N/A
	Total	100%	100%

Particularly, the use of portfolios was to assess the student's competency in the expression of appreciation and criticism of the production of three different types of multimedia application - computer game, computer animation and visual effects, in local digital entertainment industry. When preparing portfolios related to each application, students were asked to select one of their favorite multimedia products and to explain why the product was valuable to them. They had to comment professionally about the character design, story or game design, techniques about the production of the product. They were also asked to use their creativity to improve the product.

On the basis of these requirements, grading checklists were drawn up, to be used by the teachers to achieve inter-rater reliability. To the extent the work provided by students matched each criterion considered in the checklists, grades from Very Good (5) to Poor (1) was assigned to mark the portfolio. The portfolio contents also included optional items to allow students to display their best work. Bonus marks were given for the good works displayed.

Comparison of students' achievement in Module I

In order to compare the achievement of students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment, assessment data of the Module I were collected from the two groups of students. The assessment scores from 2006-08 cohort and 2007-09 cohort are summarised in Table 4.11 and Table 4.12 respectively.

Table 4.11 Assessment scores of the Module I from 2006-08 cohort

	2006-08 Cohort (Control)			
Assessment Method	Number of students	Number of scores collected	Mean	Standard deviation
Continuous Assessment	359	338	53.4	15.6
Test	359	338	56.6	14.9
Overall Result of Module I	359	338	55.6	14.1

Table 4.12 Assessment scores of the Module I from 2007-09 cohort

	2007-09 Cohort (Experiment)			
Assessment Method	Number of students	Number of scores collected	Mean	Standard deviation
Continuous Assessment	314	301	55.2	12.3
Test	314	301	55.4	14.5
Portfolio Assessment	314	301	57.2	15.4
Overall Result of Module I	314	301	55.7	12.6

The results show that the mean marks for the continuous assessment and test for the two cohorts were very close and the differences were within 5%. The mean overall results of the Module I from the two groups were 55.6 and 55.7 and this indicated that the students' achievement was very similar in two cohorts. However, it was found that the mean mark for portfolio assessment was slightly higher than the other two mean marks for 2007-09 cohort.

Analysis on students' achievement in Module I

A two-sample t-test was performed to determine whether there was a significant difference between the students' achievements on continuous assessment, test and overall result of Module I from 2006-08 cohort and 2007-09 cohort. Results of the t-value computed are summarized in the Table 4.13.

Table 4.13 t-value for the continuous assessment and test

Assessment Method	Groups	Number of student	Mean	Standard deviation	t-value	Degrees of freedom
Continuous Assessment	2007-09 Cohort (Experiment)	301	55.2	12.3	1.628	637
	2006-08 Cohort (Control)	338	53.4	15.6		
Test	2007-09 Cohort (Experiment)	301	55.4	14.5	1.031	637
	2006-08 Cohort (Control)	338	56.6	14.9		
Overall Result of Module I	2007-09 Cohort (Experiment)	301	55.6	14.1	0.094	637
	2006-08 Cohort (Control)	338	55.7	12.6		

It is noted that the all the three t-values do not exceed the t-critical at 95% confidence level. The result concluded that there was no significant difference between the learners' achievement in continuous assessment and test from the two groups of

students. Finally, it was also found that there was no significant difference between the overall result of Module I achieved by the two cohorts of students. A possible explanation of this result is that the marks of portfolio assessment only accounts for 10% of the overall result. The change of assessment method in one of the assessment components might not impose significant difference on the students' overall achievement in the module.

Correlation interpretation of portfolio assessment and other assessments

It is essential to find out what portfolios assessment scores of the students related to the scores of the other two assessments methods – continuous assessment and test. A correlation coefficient test was conducted to measure the interconnection between the portfolio assessment scores and continuous assessment scores. Another correlation coefficient test was also conducted for portfolio assessment scores and test scores. The results of the two tests are presented in Table 4.14.

Table 4.14 Correlation interpretation of portfolio and other assessment scores

Number of students	Measures	Mean	Standard deviation	Correlation coefficient	Square value of correlation coefficient
301	Portfolio assessment	57.2	15.4	0.695	0.483
	Continuous assessment	55.2	12.3		
301	Portfolio assessment	57.2	15.4	0.644	0.415
	Test	55.4	14.5		

The table shows that a correlation of r = 0.695 was reported between scores of portfolio assessment and scores of continuous assessment. Similarly, a correlation of r = 0.644 was found between the scores of portfolio assessment and scores of test The results of these analyses show that, the portfolio assessment scores correlate positively, to a reasonable degree, with those of the continuous assessment and test.

Moreover, the result of coefficient of determination which is equal to the square value of correlation coefficient indicated that 48.3% of the variability of portfolio assessment scores could be explained by continuous assessment scores. Also, 41.5% of the variability of portfolio assessment scores could be explained by test scores. The results revealed that achievement in continuous assessment is a better predictor of the performance of portfolio assessment than it is of achievement in test.

Summary of Findings on Students' Achievement

Based on the comparison and subsequent analysis of assessment data collected from students participating in the applied learning course with portfolio assessment to students enrolled in the same course without portfolio assessment, findings on the impact of students' achievement by introducing portfolio assessment as one of the assessment methods can be summarized as follows:

1. The students' achievement in the two forms of assessment, continuous assessment and test, were comparable and there was no significant difference between scores obtained from the two cohorts of students (t=1.628 for continuous assessment and t=1.031 for test). Furthermore, the two groups of students achieved comparable overall result in Module I and again no significance difference was detected (t=0.094). The results revealed that the introduction of portfolio assessment as one of the assessment methods did not significantly improve the students' achievement.

2. The analyses of the assessment data from the students participating in the applied learning with portfolio assessment show that, the portfolio assessment scores correlated positively, to a reasonable degree, with those of the continuous assessment (r=0.695) and test (r=0.644). The results indicated that achievement in portfolio assessment related highly to the performance of the other assessments.

3. Finally, the mean mark for portfolio assessment (57.2) was found slightly higher than the assessment scores in continuous assessment (55.2) and test (55.4).

However, further analysis could not be undertaken as there was only one set of data available in this study.

Results of Students' Learning Experience and Attitude

In order to understand the learning experience and attitude of the two cohorts of students, the satisfaction questionnaire survey was conducted to explore the attitude of participants towards their learning experiences. They were asked to take a few minutes of their time to choose the responses which best described their opinion in relation to the Module I of the applied learning course they had taken. For the 2007-09 cohort, students were also asked to evaluate their experience with the portfolio assessment. Table 4.15 outlines of the number of survey questionnaires distributed and the number of responses received from each of the two cohorts of students.

Number of questionnaires

Table 4.15 Distribution of survey questionnaires by cohort

Cohort	Questionnaires distributed	Number of responses	Response rate
2007-09 (Experiment)	308	254	82.5%
2006-08 (Control)	290	237	81.7%

The response rates of the questionnaires for the two cohorts were both over 80%. Those who did not complete the survey were either absent or unwilling to participate.

Students' learning experience

When asked to rate 8 statements in terms of their learning experience on Module I (Multimedia Fundamentals), the respondents rated their responses on a Likert scale of 5, from strongly agree, agree, neutral, disagree, and strongly disagree. The first three statements were related to curriculum design of the module while the next three statements were related to the form of assessment used. The last two statements

concerned with the learners' responsibility for their own learning and overall satisfaction. Summary of the responses from the 2006-08 cohort and 2007-09 cohort are displayed in the Table 4.16 and Table 4.17 respectively.

Table 4.16 Responses on the learning experience of Module I for 2006-08 cohort

No.	Statement	Number of responses	Agree to strongly agree
1	This module gave me a good introduction to the field of multimedia.	237	87.8%
2	The objectives of the module were clear.	237	82.7%
3	There was a good balance between theoretical and practical concerns.	234	73.5%
4	The methods of assessment used were appropriate for the subject.	230	68.3%
5	The assessment process used in this subject helped me to learn the material.	234	67.5%
6	The teacher gave me constructive feedback on my assessed work.	237	71.3%
7	I learned to feel responsible for my own learning.	236	73.7%
8	Overall I was satisfied with the teaching and learning of this module.	237	82.3%

The result shows that most of the participants in the control group (2006-08 cohort) were in agreement with the curriculum design of the module related to the module aims, objectives and contents. The majority of the participants in the control group also agreed with the appropriateness of assessment method used, effectiveness of assessment process, and constructive feedback obtained from the teacher. Finally, most of the students in the control group indicated they learned to feel responsible for their learning (73.7%) and they were satisfied with the teaching and learning of the module (82.3%).

Table 4.17 Responses on the learning experience of Module I for 2007-09 cohort

No.	Statement	Number of responses	Agree to strongly agree
1	This module gave me a good introduction to the field of multimedia.	253	84.6%
2	The objectives of the module were clear.	254	77.2%
3	There was a good balance between theoretical and practical concerns.	253	73.1%
4	The methods of assessment used were appropriate for the subject.	251	71.7%
5	The assessment process used in this subject helped me to learn the material.	254	69.3%
6	The teacher gave me constructive feedback on my assessed work.	254	75.2%
7	I learned to feel responsible for my own learning.	254	81.5%
8	Overall I was satisfied with the teaching and learning of this module.	253	85.0%

The results obtained from the 2007-09 cohort was in general similar to those of the 2006-08 cohort except the statement 7 which was asked if the participants learned to feel responsible for their own learning. The percentage of participants who were in agreement that they learned to feel responsible for their own learning was 81.5% for the experimental group (2007-09 cohort) while it was 73.7% for the control group (2006-08 cohort).

The results also revealed that there was a slightly higher percentage of agreement for the three statements related to the assessment: the appropriateness of assessment method used (68.3% for 2006-08 cohort and 71.7% for 2007-09 cohort), effectiveness of assessment process (67.5% for 2006-08 cohort and 69.3% for 2007-09 cohort), and constructive feedback obtained from the teacher (71.3% for 2006-08 cohort and 75.2% for 2007-09 cohort). The valuation of overall satisfaction of the module was also slightly higher for the experimental group (82.3% for 2006-08 cohort and 85.0% for 2007-09 cohort).

Comparison of students' learning experience

An objective of this study was to determine whether portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress. A two-sample t-test between proportions was performed to determine whether there was a significant difference between 2006-08 cohort and 2007-09 cohort with respect to the evaluation of their learning experience of Module I. Results of the t-value related to the curriculum design and assessment of the module are summarized in the Table 4.18 and Table 4.19 respectively.

Table 4.18 t-value for the curriculum design of Module I of the two cohorts

Statement	2006-08 Cohort (Control)		2007-09 Cohort (Experiment)		t-value	Degree of freedom
	Number of responses	Agree to strongly agree	Number of responses	Agree to strongly agree		
This module gave me a good introduction to the field of multimedia.	237	87.8%	253	84.6%	1.017	488
The objectives of the module were clear.	237	82.7%	254	77.2%	1.527	489
There was a good balance between theoretical and practical concerns.	234	73.5%	253	73.1%	0.095	485

The results showed that all of the t-values did not exceed the t-critical at 95% confidence level. Therefore, it is concluded that the difference for the students' perception on the curriculum design of Module I between the two cohorts was not significant. As there was no change between the module content except the introduction of portfolio as one of the assessment tasks, the results confirmed that the two groups of students had no significant difference in opinions about the module aims, objectives and contents.

Table 4.19 t-value for the assessment of Module I of the two cohorts

Statement	2006-08 Cohort (Control)		2007-09 Cohort (Experiment)		t-value	Degree of freedom
	Number of responses	Agree to strongly agree	Number of responses	Agree to strongly agree		
The methods of assessment used were appropriate for the subject.	230	68.3%	251	71.7%	0.826	479
The assessment process used in this subject helped me to learn the material.	234	67.5%	254	69.3%	0.420	486
The teacher gave me constructive feedback on my assessed work.	237	71.3%	254	75.2%	0.974	489

The results showed that all of the t-values did not exceed the t-critical at 95% confidence level. Although there was an increase of the percentage of participants who agreed or strongly agree for the three statements on assessments, the result of t-test indicated that the difference between the two cohorts was not significant.

As discussed in the previous section, portfolio assessment was introduced as one of the assessment tasks and the marks of portfolio assessment only accounts for 10% of the overall result. The change of assessment method in one of the assessment components might not impose significant difference on the students' overall opinion on the assessments used in the module.

Finally, another two-sample t-test between proportions was performed to determine whether there was a significant difference between the two cohorts with respect to the evaluation of their improvement of responsibility and overall satisfaction of Module I. Results of the t-value related to the curriculum design and assessment of the module are summarized in the Table 4.20.

Table 4.20 t-value for the improvement of responsibility and overall satisfaction of the two cohorts

Statement	2006-08 Cohort (Control)		2007-09 Cohort (Experiment)		t-value	Degree of freedom
	Number of responses	Agree to strongly agree	Number of responses	Agree to strongly agree		
I learned to feel responsible for my own learning.	236	73.7%	254	81.5%	2.066	488
Overall I was satisfied with the teaching and learning of this module.	237	82.3%	253	85.0%	0.809	488

For the improvement of responsibility, the t-value exceeded the t-critical at 95% confidence level and thus it can be concluded that there was a significant difference between the two groups of students in learning responsibility, indicating that the experimental group with portfolio assessment had a positive improvement on learning to be responsible for their learning.

A possible explanation of this result is that the experimental group of students needed to submit on-line portfolios for assessment. As on-line portfolios could be viewed by all their peers, the students were perhaps more aware of their progress and therefore most of them respond that they learnt to feel responsible of their learning.

However, the t-value for overall satisfaction did not exceed the t-critical at 95% confidence level. The result showed that the difference between the two groups of students in overall satisfaction of the teaching and learning of the module was not significant.

In order to understand more about the learning attitude of the students from the experimental group towards the portfolio assessment, the students of the 2007-09 cohort were further asked to complete the second part of the questionnaire survey which was design to collect students' views on portfolio assessment. The results are presented in the next section.

Students' learning experience and attitude towards portfolio assessment

As discussed in the previous section, students with portfolio assessment (2007-09 cohort) were found to have a positive impact on learning to be responsible for their learning. In order to find out more about their views on portfolio assessment, they were asked to rate 3 statements in terms of their learning experience and 6 statements about their learning attitude towards the production of portfolio. Finally, they were asked to rate a statement about the assessment criteria of the portfolio. The respondents rated their responses on a Likert scale of 5, from strongly disagree, disagree, neutral, agree, and strongly agree. These choices were than given numerical values of 1 to 5 for the statistical analysis of the responds. Summaries of the responses for learning experience and learning attitude are displayed in the Table 4.21 and Table 4.22 respectively.

Table 4.21 Responses on the learning experience on portfolio assessment for 2007-09 cohort

No.	Statement	Number of responses	Agree to strongly agree	Mean	Standard Deviation
1	The teacher has guided sufficiently in preparing my portfolio.	253	88.1%	4.11	0.72
2	Preparing a portfolio has helped me to understand the topics/content of this course.	252	77.4%	3.88	0.76
3	Preparing a portfolio has helped me to practice the skills learnt in this module.	254	75.6%	3.86	0.82

The responses showed that most of the participants agreed that the teacher had provided sufficient help for them in preparing their portfolios (4.11). It is important to note that more than 75% of the students agreed or strongly agreed that preparing a portfolio helped them to understand the content (77.4%) and practice the skills learnt

(75.6%). Then mean scores show that in average their responses in the above two statements are very close to agree (3.88 and 3.86).

Table 4.22 Responses on the learning attitude towards portfolio assessment for 2007-09 cohort

No.	Statement	Number of responses	Agree to strongly agree	Mean	Standard Deviation
4	It takes too much of my time to prepare a portfolio.	251	53.4%	3.56	0.94
5	It is worth the effort to prepare a portfolio.	246	71.1%	3.89	0.85
6	I like to work on my portfolio on my own.	254	66.5%	3.72	0.94
7	I like to share the work in my portfolio with my classmates.	252	56.0%	3.59	0.92
8	I like to put work in my portfolio that is relevant to the study.	252	60.0%	3.64	0.91
9	I like to present the contents of my portfolio to other people.	253	64.0%	3.72	0.90

Results showed that the students were not consistent in their appraisal of time and effort spent for preparation of portfolio. Only more than half of the participants agreed or strongly agreed that it took too much of their time to prepare a portfolio (53.4%). In other words, nearly half of the participants did not agree with this statement and they were willing to spend their time to prepare the portfolio. However, when asked to rate whether it was worth the effort to prepare a portfolio, the majority of the participants (71.1%) were in agreement that it was worth the effort to prepare the portfolio.

As there was only 66.5% of the participants responded that they liked to work on their portfolio on their own, the result indicated that some of the students preferred to

work on their portfolios with others. The students might need help from the teachers or other people in order to prepare their portfolios for assessment.

It is interesting to note that more students tended to agree to share their portfolios with other people (64.0%) rather than classmates (56.0%). A possible explanation of this result is that the students might have concerns that the content of their portfolios submitted on-line could be referenced by other classmates. As the platform used for hosting the portfolios did not provide proper functions for the teachers to control the visibility of the students' portfolios submitted, plagiarism would be an issue which should be addressed for the implementation of portfolio assessment.

As all the 4 survey responses on attitude towards portfolio assessment were all with mean scores above 3.5, the results indicated that the majority of the participants of the experimental group (2007-09 cohort) had positive attitude towards their learning with portfolio assessment.

When asked to rate the statement whether they would like to know what criteria are used to assess their portfolios, the result was summarised in Table 4.23.

Table 4.23 Responses on assessment criteria for 2007-09 cohort

No.	Statement	Number of responses	Agree to strongly agree	Mean	Standard Deviation
10	I would like to know what criteria are used to assess my portfolio.	252	71.0%	3.82	0.87

The majority of the participants (71.0%) were in agreement that they were concerned about the criteria used for assessing their portfolios. This result indicated that the students had strong motivation to know about how their portfolios were assessed.

Summary of Findings on Students' Learning Experience and Attitude

Based on results of the questionnaire survey conducted for students participating in the applied learning course with portfolio assessment and students enrolled in the same course without portfolio assessment, findings on the impact of introducing portfolio assessment as one of the assessment tasks on students' learning experience and attitude can be summarized as follows:

1. The students' learning experience were comparable and there was no significant difference between the opinions of curriculum design from the two cohorts of students (t=1.017 for the module aims, t=1.527 for the module objectives, and t=0.095 for the module contents). Furthermore, the majority of the two groups of students were in agreement with the experience brought by the assessments and, again, no significance difference was detected (t=0.826 for the appropriateness of assessment method used, t=0.420 for the effectiveness of assessment process, and t=0.974 for the constructive feedback obtained from the teacher). Finally, the result showed that the difference between the two groups of students in overall satisfaction of the teaching and learning of the module was also not significant (t=0.809).

2. There was a significant difference (t=2.066) between the two groups of students in learning responsibility, indicating that the experimental group with portfolio assessment had a positive improvement on learning to be responsible for their learning. The results revealed that the introduction of portfolio assessment as one of the assessment methods significantly improved the students' attitude towards their responsibility.

3. The survey responses on attitude towards portfolio assessment indicated that the majority of the participants of the experimental group (2007-09 cohort) had positive attitude in monitoring their learning with portfolio assessment. However, further analysis could not be undertaken as there was only one set of data available in this study.

4. It is interesting to note that more students tended to agree to share their portfolios with other people (64.0%) rather than classmates (56.0%). Another interesting result is that the students were not consistent in their appraisal of time (53.4%) and effort (71.1%) spent for preparation of portfolio.

Summary

This part of the study aimed to explore the impact of the portfolio assessment on students' achievement and learning attitude. The cohort of students with portfolio assessment (2007-09) was considered as the experimental group and the other cohort without portfolio assessment (2006-08) as the control group. The homogeneity of the two groups of students was first checked in terms of demographics of the students and on their motivation of learning multimedia. The study was then carried on to compare the two cohorts of students' achievement and learning experience in order to find out the impact of portfolio implementation.

Findings from the comparison of the students' achievement reveal that there was no significant difference between scores obtained from the two cohorts of students ($t=1.628$ for continuous assessment, $t=1.031$ for test, and $t=0.094$ for the overall result). It can be concluded that the introduction of portfolio assessment as one of the assessment methods did not significantly improve the students' achievement.

Further analyses on the assessment data from the students participating in the applied learning with portfolio assessment show that, the portfolio assessment scores correlated positively, to a reasonable degree, with those of the continuous assessment ($r=0.695$) and test ($r=0.644$). The results indicated that achievement in portfolio assessment related highly to the performance of the other assessments.

Finally, the mean mark for portfolio assessment (57.2) was found slightly higher than the assessment scores in continuous assessment (55.2) and test (55.4). However, further analysis could not be undertaken as there was only one set of data available in this study.

Findings from the comparison of the students' learning attitude revealed that there was no significant difference between the opinions of curriculum design (t=1.017 for the module aims, t=1.527 for the module objectives, and t=0.095 for the module contents) and experience on assessment issues (t=0.826 for the appropriateness of assessment method used, t=0.420 for the effectiveness of assessment process, and t=0.974 for the constructive feedback obtained from the teacher) from the two cohorts of students. The result also showed that the difference between the two groups of students in overall satisfaction of the teaching and learning of the module was also not significant (t=2.809).

There was a significant difference (t=2.066) between the two groups of students in learning responsibility, indicating that the experimental group with portfolio assessment had a positive improvement on learning to be responsible for their learning. The survey responses on attitude towards portfolio assessment indicated that the majority of the participants of the experimental group (2007-09 cohort) had positive attitude in monitoring their learning with portfolio assessment. However, further analysis could not be undertaken as there was only one set of data available in this study.

In the next chapter, the results and findings relevant to the other two research questions concerning the teachers' perception on the use of portfolios for assessing a student's competency and their professional development needs are presented.

CHAPTER FIVE

RESULTS OF STUDY II – TEACHERS' PERCEPTION ON THE USE OF PORTFOLIO ASSESSMENT

While the previous chapter presents the results and findings for the impact of the portfolio assessment on students' achievement and learning attitude, this chapter reports the results and findings concerning the teachers' perception on the use of portfolio assessment and their professional development needs for implementing the use of portfolios for assessing a student's competency. Responses from the survey and interviews were combined and integrated in presenting the results of the study.

This part of study was designed to explore the teachers' perceptions on the use of portfolios for assessing a student's competency as well as their professional development needs for portfolio assessment in applied learning. It attempted to model teachers' perceptions of portfolio assessment as appropriate and effective tools in assessing students' competency and professional development in relation to the relevant variables. All the teachers who taught the 2006-08 and 2007-09 cohorts of students were selected to carry out the study and data collected was particularly to answer the following two research questions:

- To what extent have portfolios provided a means of assessment of the students' competency?

- What are current and future professional development needs of teachers using portfolio assessment in applied learning?

A survey questionnaire (see Appendix D) was designed to collect teachers' opinion on the use of portfolios for accessing a student's competency and their professional development needs. The questionnaire consisted of four sections:

1) Personal Particulars

2) Experience with the Use of Portfolios
3) Use of Portfolios for Assessing Students' Competency in Applied Learning
4) Professional Development Needs for Portfolio Assessment in Applied Learning

The majority of the questions were asked to express the level of agreement of participants on the statements provided using a five-level Likert scale. The rest of the questions were open-end questions which were asked to specify the others if the respondents thought appropriate. The questionnaire survey was conducted in March 2008 when the delivery of Module I was completed for 2007-09 cohort. After the completion of survey, all the teachers were invited to attend a follow up interview individually. Interview guide questions (see Appendix E) which were developed from the questions included in the survey were used to further collect data about the participants' feedbacks and concerns regarding the assessment method introduced in the applied learning course. Analysis of data, collected by both quantitative and qualitative methods with surveys and interviews, is included in this chapter to understand the teachers' perceptions of the use of portfolios for assessment.

Participants' Profile

The participants of this part of study were all teachers who taught the Module I of the piloting applied learning course Creative Multimedia Studies offered by the Department of Multimedia and Internet Technology of Hong Kong Institute of Vocational Education (Tsing Yi) in 2006-08 cohort and 2007-09 cohort. The total number of teachers included in the study was 10. Among the 10 teachers, only 1 of them is teacher of secondary school while the rest are Lecturer/Teaching Associate of Hong Kong Institute of Vocational Education (IVE). The survey questionnaire was sent to the 10 teachers and all of them completed and return the questionnaire. Regarding to the interview, 8 out of the 10 teachers attended the interview while the other 2 teachers were unable to attend the interview. All the interviews were conducted of about 30 minutes in average.

Gender and age

The first section of the survey questionnaire asked the personal particulars of the participants. They included male and female teachers who taught the Module I of the applied learning course. They are classified in four different age groups, ranging from under 25 to 45 and over. It is important to note that the majority of the participants are male aged 25 to 34, whereas there is only one of those 45 and over. Male participants make up 80% of the total participants. Table 5.1 indicates the distribution of participants by gender.

Table 5.1 Participants by gender

Gender	Frequency	Percent
Male	8	80.0
Female	2	20.0
Total	10	100.0

Table 5.2 outlines the distribution of participants by age, in which only 1 (10.0%) of those is of the age 45 or over. The majority of the participants (70%) are of the age 25 to 34 and two of them are under 25. Table 5.2 shows the distribution of participants by age.

Table 5.2 Participants by age

Age	Frequency	Percent
Under 25	2	20.0
25 - 34	7	70.0
35 - 44	0	0.0
45 - over	1	10.0
Total	10	100.0

Education level

Question 3 and 4 on the survey questionnaire asked the participants about their highest education level and whether or not they have any formal qualifications in the

field of education. The majority of participants held Bachelor's degrees while none held a Doctoral degree. Table 5.3 outlines the participants' education level.

Table 5.3 Participants' highest educational degrees earned

Gender	Frequency	Percent
Bachelor	7	70.0
Master	3	30.0
Doctoral	0	0.0
Total	10	100.0

Qualifications in education

It is noted that 70% of the participants did not have any formal qualifications in teacher education which meant that they joined the teaching profession with no or little background of pedagogy. The reason for this is due to the fact that there is no formal qualification requirement in teacher education for a teacher to be appointed as Lecturer/Teaching Associate of IVE. However, there is a minimum requirement of 3 years of relevant working experience for the appointment of Lecturer of IVE. Table 5.4 shows the participants' qualifications in education.

Table 5.4 Participants' qualifications in education

Qualification in education	Frequency	Percent
No	7	70.0
Yes	3	30.0
Total	10	100.0

Teaching experience

Question 5, 6 and 7 on the survey questionnaire asked the participants about their overall teaching experience, teaching experience of applied learning and industrial working experience. The majority of participants had 1-3 years of overall teaching experience as well as teaching experience of applied learning. Most participants also

had 1-3 years of multimedia related industrial working experience. Out of the 10 teachers surveyed, there was only one teacher who had just started his teaching career in the academic year the study took place. Table 5.5 outlines the participants by the number of years of their overall teaching experience.

Table 5.5 Participants' years of teaching experience

Number of years	Frequency	Percent
Less than 1	1	10.0
1 – 3	6	60.0
4 – 6	1	10.0
Over 6	2	20.0
Total	10	100.0

Teaching experience of applied learning

All the participants were also asked about their teaching experience of applied learning of multimedia course. There were two teachers who had just started his teaching of applied learning in the academic year the study took place. The majority of participants (60%) had 1 – 3 years of teaching experience of applied learning. Table 5.6 outlines the participants by the number of years of teaching experience of applied learning.

Table 5.6 Participants' years of teaching experience of applied learning

Number of years	Frequency	Percent
Less than 1	2	20.0
1 – 3	6	60.0
4 – 6	2	20.0
Over 6	0	0.0
Total	10	100.0

Industrial working experience

Finally, the participants were asked about their multimedia related working experience, only two of the participants had less than 1 year of working experience. 40% participants had 1-3 years of working experience while the rest (40%) had more than 4 years of working experience. The result indicates that most of the teachers had relevant working experience to identify the competency of students in the area of multimedia.

Table 5.7 Participants' years of industrial working experience

Number of years	Frequency	Percent
Less than 1	2	20.0
1 – 3	4	40.0
4 – 6	3	30.0
Over 6	1	10.0
Total	10	100.0

Summary of the participants' profiles

In conclusion, the majority of participants in this survey were male teachers aged 25-34. There were only 2 female teachers. The participants were teachers in secondary school and Lecturer/Teaching Associate of IVE. All of these teachers had at least Bachelor's degrees but most of them did not have formal qualification in education. The majority of the participants had 1-3 years of teaching experience as well as industrial working experience. More than half of the teachers taught applied learning course for 1-3 years.

Teachers' Experience with the Use of Portfolios

The second section of the survey questionnaire asked the participants about their experience with the use of portfolios. All the participants were asked whether they

had experience in constructing their own portfolio. Table 5.8 shows that most of the participants (80%) indicated that they had experience in producing their own portfolio. For those teachers who responded that they did not have experience on constructing their own portfolio, they were requested to skip this section and continue to answer the questions of the third section.

Table 5.8 Participants' experience in constructing portfolio

Experience in constructing portfolios	Frequency	Percent
No	8	80.0
Yes	2	20.0
Total	10	100.0

For those teachers who had experience in constructing portfolio, they were further asked to state whether they had received any kind of portfolio-related training prior to commencing their portfolio construction. Half of them (50%) stated that they had had some training related to portfolios and Table 5.9 outlines the results.

Table 5.9 Participants' experience in portfolio-related training

Experience in portfolio-related training	Frequency	Percent
No	4	50.0
Yes	4	50.0
Total	8	100.0

When asked to provide additional information of the form of training and comment on the usefulness of the training, only three respondents provided information which included the following:

- *Short course in teacher training.*
- *Teaching portfolio production in teacher training.*
- *Digital and hand-on experience of producing portfolio in degree study.*
- *During the lesson I need to hand in my assignment using portfolio, the*

teacher will give guidelines on it.

It is interesting to note from the responds that one of the respondents might not have received any portfolio-related training. The other two respondents had received teacher training on teacher portfolio construction. However, no respondent commented on the usefulness of the training received.

Purposes of the construction of portfolio

Question 2.3 asked the respondents to rate 5 statements in terms of importance as to state the purpose of the construction of portfolio. Five ordered response levels were used: most important, very important, moderately important, little important and not important. Summary of the responses is presented in Table 5.10.

Table 5.10 Responses on purposes of the construction of portfolio

No.	Statement	Number of responses	Very important to most important
2	To fulfil the requirements of your professional development	8	100.0%
5	To apply for a job or higher official ranking	8	100.0%
1	To fulfil the requirements of your own study	8	87.5%
4	To keep track of your own works and personal achievements	8	87.5%
3	To improve your teaching	8	67.5%

The results show that all the participants were in agreement that their purposes of the construction of portfolio were considered important to satisfy the requirements of their professional development and job application. Most of the participants (87.5%) agreed that it was important to construct portfolio to fulfil the requirements of their own study and keep track of personal achievements. However, as 67.5% of the participants were in agreement that their purpose of the construction of portfolio was

related to improvement of their teaching, the results show that this purpose was the least important as compared with the other four purposes.

The teachers were further asked to rate 8 statements of their opinion in constructing their own portfolios. Five ordered response levels were used: strongly agree, agree, neutral, disagree and strongly disagree. The following table summarizes the opinions of the respondents.

Table 5.11 Participants' opinion in constructing portfolio

No.	Statement	Number of responses	Agree to strongly agree
1	Compiling a portfolio has made me more confident	8	75.0%
2	Compiling a portfolio has made me more organized in my approach to present myself	8	100.0%
3	Compiling a portfolio has motivated me	8	67.5%
4	Compiling a portfolio put great pressure on me	8	75.0%
5	Compiling a portfolio has increased my workload	8	67.5%
6	I am lack of proper training to construct my portfolio	8	25.0%
7	The content of the portfolio is sufficient in reflecting my competency	8	75.0%
8	I would like to continue to develop on my portfolio in future	8	87.5%

The first three statements focused mainly on the benefits while the statements 4 to 6 addressed the difficulties the participants experienced during the portfolio construction process. The majority of the participants agreed that compiling a portfolio has benefits of better presentation, improved confidence and motivation. They also agreed that they experienced difficulties of the pressure and workload introduced by the portfolios. However, it is interesting to note that most of the applicants did not think that they were lacking proper training.

The last two statements asked for the opinion of the participants regarding the usefulness of portfolio for reflecting competency and whether they would continue to develop portfolio. The results show that most of the participants thought that the content of the portfolio was sufficient in reflecting their competency. Finally, the majority of the participants indicated that they would continue to develop their portfolio.

Summary of teachers' experience with the use of portfolios

In summary, all of the 10 participating teachers in this study have experience on constructing their own portfolio but most of them stated that they have not received any kind of portfolio-related training prior to commencing their portfolio construction.

The majority of the participants were in agreement that their purposes of the construction of portfolio were considered important to satisfy the requirements of their professional development, study, job application and personal achievement. However, the results show that the purpose of improvement of teaching was the least important as compared with the other four purposes.

Regarding the experience with the use of portfolios, most of the participants shared the common benefits and difficulties stated. In general, they thought that portfolios were useful in reflecting their competency and would continue to develop their portfolio.

Teachers' Perceptions of the Use of Portfolios for Assessment

The third section of the survey questionnaire asked the participants about the benefits and problems they expected from the use of portfolios for assessment. In applied learning, an attempt was made to distinguish two aspects of classroom behaviour: learning new knowledge and skills through alternative approach, and proving that the learning has been accomplished through a more authentic form of assessment. The

applied learning course wants a blend of formats with emphasis on the need for assessment which possesses broad potential for indicating the competency of student. As the discussion proceeds, focus falls upon authentic assessment instruments such as portfolio assessment and its potential to provide clear indications of student competency (EMB, 2006). Wiggins (1989) defined authentic assessment as activities that engage students in applying and/or demonstrating knowledge and skills in real world situations. Hart (1994) further categorized authentic assessment into performance assessment, portfolio assessment, and reflection and self-assessment. In this area, the study focused on finding out how teachers perceived the use of portfolios for assessing students' competency in applied learning and whether or not they thought portfolios were appropriate and effective tools in performance assessment. The teachers were also asked to rate the appropriateness of common assessment methods including portfolio assessment used for providing evidence of the students' competency.

Benefits expected from the use of portfolio for assessment

Question 3.1 asked the teachers the benefits they expected to gain from the use of portfolios for assessing the students' competency. Five ordered response levels were used: strongly agree, agree, neutral, disagree and strongly disagree. Table 5.12 outlines the summary of the participants' responses on the benefits they expected from the use of portfolios for assessment.

Table 5.12 Reponses on the benefits expected from the use of portfolios for assessment

No.	Statement	Number of responses	Agree to strongly agree
1	Collect evidence of the students' competency	10	100.0%
2	Reflect on my teaching and student learning	10	90.0%
3	Better understand students' learning	10	90.0%
4	Motive students to learn	10	90.0%
5	Improve the current assessment methods	10	80.0%

The results show that the majority of the respondents were in agreement with the five statements about the benefits expected from the use of portfolios for assessment. Particularly, all the participants agreed that the use of portfolios could collect evidence of the students' competency.

Other benefits expected from the teachers for the use of portfolios for assessment include the following:

- *Students are able to share their ideas and skills by browsing other portfolios.*
- *When sometimes the students are not capable to work out their idea, they can use words to explain their concept which makes me has more reference in marking.*
- *Platform to collect artwork for students.*
- *All portfolios could be listed to all students studying the CMS. Students of a class could see portfolios produced from other classes for motivation.*

The survey responses were reaffirmed by similar responses from those 8 teachers interviewed. All of the interview respondents agreed that portfolios provided a good means to collect evidence of the students' competency on multimedia appreciation which was the assessment task of the applied learning. Some teachers commented that the portfolios can provide a reflection of the students' learning and some students were motivated to take part in this assessment task as compared with other assessment tasks.

Teacher C: *"...I find the completion of assessment tasks is one of the problems of my class. Some of the students are less motivated in attending the class and they tend to not submit works for the completion of assessment tasks. However, when it came to producing portfolio work which was going to be displayed on the Internet, there was improved participation. Portfolios can stimulate improved completion of tasks through competition between peers. The students wanted to master the tasks at the same level as their peers."*

Teacher D: *"...Not every student was motivated by portfolios. However, portfolios inspire some students to produce a greater quantity of work. They really exceed what you could have imagined they could have produced for you."*

Teacher E: *"...I really want to look at those portfolios which are not produced by my students. Their portfolios let me have an idea about the learning of my students as compared with other students... Sometimes, I would like to discuss about my students' portfolios with other teachers..."*

Teacher G: *"...I was impressed that someone who was not a top student had successfully completed the game appreciation task and presented an argument. The assessment scored highly, despite obvious mistakes such as the details of the game operation and game play. Some are inspired, most are indifferent. The use of a different kind of assessment provided motivation for some students who would not otherwise have been as enthusiastic."*

Problems with the use of portfolios for assessment

Question 3.1 asked the teachers about the problems they expected to encounter from the use of portfolios for assessing the students' competency. Five ordered response levels were also used. Table 5.13 outlines the summary of the participants' responses.

Table 5.13 Reponses on the problems expected from the use of portfolios for assessment

No.	Statement	Number of responses	Agree to strongly agree
2	Lack of acceptable standard in portfolio evaluation	10	80.0%
3	The assessment process is time consuming	10	70.0%
4	Inadequate to reflect all aspects of the students' competency	10	70.0%
5	Lack of clear and concrete policies	10	70.0%
1	No guarantee for the originality of the portfolio content	10	50.0%

The results show that the majority of the participants were in agreement with four of the five statements about the expected problems from the use of portfolios for assessment. However, only half of the participants (50%) agreed that there was no guarantee for the originality of the portfolio content.

Other problems expected from the teachers for the use of portfolios for assessment include the following:

- *Some students have problems in constructing their portfolios as they do not know Chinese input method and it is difficult for them to express their ideas in English.*
- *Some of the schools blocked the website and the students cannot construct their on-line portfolios.*
- *Some students have difficulties in managing and accessing their on-line portfolios.*

When asked during the interviews to describe an example of the major problem they experienced in conducting portfolio assessment, most respondents said they had extra work load as it was the first time to implement the portfolio assessment. Some teachers believed that these over loadings were the main problem in conducting portfolio assessments. Some teachers concerned that some students who were weak in writing skills may not have the ability of completing the portfolio.

Teacher A: *"...It is quite time consuming because I need to read through all portfolios submitted by the students. Some of the portfolios were not put in good order and they are difficult to read. I thin it may increase my pressure because I have a lot of work to do this year and I spent a lot of time to mark all the portfolios we I have less time in other subjects."*

Teacher C: *"...for me it was less to do with assessment and more to do with the outputs. I expect portfolio work to be of the highest quality. The students are aware that I am taking a genuine interest in their creative output. I tell them I don't want*

pages and pages at all, I just wants something interesting and good quality. I like marking them because they are quite interesting to read. "

Teacher E: *"...I find that deficiencies in the writing skills of some students caused major problems. Only a few of students are confident to take up the assessment and some of them are quite threatened by it. I have explained to them they can try and combine writing and visual contents such as photos, pictures and videos. However, the task really demanded the students' writing skills."*

Teacher F: *"...I would not recommend portfolios for use with lower ability classes. At least would recommend different tasks to be done compared with higher stream classes. The tasks involve writing and reading which many of them find difficult."*

Perceptions of different assessment methods for providing evidence on students' competency

Question 3.5 asked the teachers to rate the appropriateness of the 5 assessment methods including portfolio assessment for providing evidence of the students' competency. Five ordered response levels were used: most important, very important, moderately important, little important and not important. Summary of the responses is presented in Table 5.14.

Table 5.14 Reponses on the appropriateness of different assessment methods

No.	Statement	Number of responses	Very important to most important
5	Projects	10	100.0%
3	Skill Tests	10	90.0%
4	Portfolios	10	90.0%
1	Written Assignments	10	50.0%
2	Written Tests	10	30.0%

Results show that the majority of the participants were in agreement that projects, skill tests and portfolios were appropriate assessment methods for the applied learning course of multimedia. While 50% of respondents agreed that written assignments was appropriate assessment method, only 30% of respondents rated written tests was appropriate method for assessment. In other words, traditional assessment methods like written tests and written assignments were considered by the participants as inappropriate methods for applied learning of multimedia.

In their responses on their views on the use of written tests for the assessment in applied learning of multimedia, all interview respondents said that it was not very practical and useful assessment method for the students of applied learning course. They generally agreed that different kind of assessment method should be adopted for the assessment. However, some teachers expressed their concerns that written skills were still an important element in portfolio construction. Some of their comments were as follows:

Teacher B: *"...Written tests were sometimes preferred to extended-time project tasks because tests took less time and were not subject to thoughtful revision. Although the students do not like written tests, they acknowledged that tests took less of their time. Portfolios tasks are preferred to tests when the students are really motivated to produce a good portfolio."*

Teacher E: *"...I am concerned that there is inconsistent treatment of the portfolios by the teachers in respect of the information given, class time devoted to doing the tasks, marking criteria and consistency of marking. Without clear and explicit criteria for the assessment of the portfolio, it gives a worse result than does traditional assessment practice like written tests and assignments."*

Teacher G: *" ...the students are anxious about unfairness. They have little faith in the marking practices of their teachers when it came to the assessment of extended-response portfolio tasks."*

Teacher H: *"...as compared with written tests which are usually used to test the factual reproduction of theories, portfolios demand the students to create ideas and*

stuffs. The difficulty for students is to know whether their ideas are good enough to obtain a satisfactory grade."

In order to explore the teachers' perception of the use of portfolios for assessment, all interview respondents were asked if they thought that they are enthusiastic about the use of portfolios for assessment. On the whole, the teachers were interested in the portfolio work, intrigued to see what the students had come up with. Some of their responses were as follows:

Teacher A: *"...I don't think so because in my mind portfolio is just like a file that keeps work and I don't see it can improve my teaching. However, I think I would like to continue because most of the students will throw assignments or exercise they have done in the past. But if we have the portfolio, we can have a file for us to keep the assignments."*

Teacher C: *"...there is usually less enthusiasm to mark conventional written tests, where assessment consists of identifying whether the correct procedure has been followed and whether the correct answer has been obtained or not. When I showed other teachers my students' portfolio work, they often pointed out pieces of work that were creative, or of exceptional quality."*

Teacher D: *"...I think one thing which I would definitely do differently next year. I would give them some more guidance. We could talk about some questions we can ask, write down some ideas on the sorts of things they could ask, do a brainstorm of the class on the sorts of questions they would ask..."*

Teacher E: *"I agreed that my teaching practice had been changed by the portfolios programme. It helped me realize what my roles and responsibilities were and how the use of portfolios fit into the other assessment methods used for the course."*

Teacher G: *"It can motivate me to construct my own portfolio because it can become a record so that I can share my portfolio with my students... I found lots of fun in making my portfolio ... it led me think about many questions that I never think about..."*

Summary of Findings on Teachers' Perceptions

Based on the results from the survey questionnaire and the follow up interviews, findings on how the teachers perceived the use of portfolios as a means of assessment of the students' competency can be summarized as follows:

1. Portfolios can reflect the learning of students to teachers

It was found that portfolios provided a good means for the reflection of the learning of students to teachers. A significant indicator of this was the feedback from the teachers about the weakness of their students. They pointed out that those students with poor writing skills may have difficulties to reflect their competency in expression of appreciation and critics of production of multimedia products. However, some teachers expressed that with the use of visual contents like photos, pictures and videos, portfolios can give the students opportunity to excel by means of their talents in creative communication and presentation.

Moreover, on-line portfolios submitted by the students can allow teachers to view the works of their own students as well as students taught by other teachers. It provided further reflection of the learning of students which led to the motivation of teachers to make inter-class comparisons and share teaching ideas.

2. Portfolios are preferred to written tests as a means of assessment for applied learning of multimedia.

The participants in general agreed that portfolios are appropriate assessment activities for applied learning of multimedia. They noticed improved completion of tasks when the students were requested to submit on-line portfolios as an assessment item. Most of the participant teachers preferred the use of portfolios to written test as a means of assessment for the students' competency in multimedia literacy and critics for multimedia products. In particular, they appreciated that portfolios can reveal how the student is thinking.

3. Portfolios can change the professional practice of teachers.

Another finding is that portfolio led to a more professional approach by the teachers involved. Most of the respondents acknowledged that they had certain changes of their professional practice as a result of portfolios. They became more concerned about the fairness of markings, marking criteria and consistence of marking. Some of the teachers expressed that they compared the responses of their classes and showed exemplary student work to each other informally. They were aware of an increased need to moderate their marking decisions and tended to move away from a solo practitioner amongst the teachers.

Teachers' Professional Development Needs for Portfolio Assessment

The fourth section of the survey questionnaire asked the participants about their professional development needs for the use of portfolios for assessment. It is important to explore the teachers' role in using portfolios for assessment as they attempt to realign their teaching and learning programs in order to embrace assessment of competency through portfolios. It was thus also the aim of this study to investigate the changes of teachers' role for teaching and learning using portfolio assessment and consequently their professional development needs for portfolio assessment. In this area, the study focused on finding out how teachers perceived their constraints for using portfolio assessment and needs for proper tools. Finally, the teachers were asked to identify their professional development needs for the use of portfolio in assessing competency in applied learning.

Constraints in conducting portfolio assessment

Question 4.1 asked the teachers to rate the importance of the 5 constraints in conducting portfolio assessment. Five ordered response levels were used: most important, very important, moderately important, little important and not important. Table 5.15 outlines the participants' responses on the constraints they found important in conducting portfolio assessment.

Table 5.15 Reponses to constraints found important in conducting portfolio assessment

No.	Statement	Number of responses	Very important to most important
1	Lack of guidance and support	10	60.0%
3	Unclear understanding of the purposes	10	60.0%
4	Inadequate knowledge of portfolios and their uses	10	60.0%
5	Limited facilities for portfolio	10	60.0%
2	Lack of proper training	10	50.0%

Results show that just more than half of the participants (60%) were in agreement with the importance of the listed constraints. Particularly, only 50% of the participants agreed that lack of proper training is an important constraint for the conduction of portfolio assessment. This result seems to co-relate with the result from the participants' opinion in Statement 7 of Question 2.4: the participants generally tended to disagree that they were lack of proper training for constructing their portfolios as well as assessing students' portfolios.

Other constraints expected from the teachers for the use of portfolios for assessment include the following:

- *A professional and properly controlled platform is suggested to be used for collecting the portfolio works of students.*
- *The backup of the portfolios should be provided in order to keep sample record for meeting the quality assurance requirements.*
- *The picture format is not wide enough for different files to be uploaded to the Web.*

It is interesting to note that all of the above constraints were related to the physical constraints of the platform used by the applied learning course to post those on-line portfolios submitted by the students. These constraints should be grouped under the limited facilities for portfolio as quoted in the Statement 3.

When asked during the interviews to describe the supports they needed in conducting portfolio assessment, most respondents said they would like to have more guidance and support provided. Some teachers expressed their concerns about the platform used for hosting the portfolios. They believed that the platform should be dedicated to the course and under their control instead of a public platform. It is also interesting to note that most interview respondents would like to receive proper training while this request was not reflected in the survey questionnaire.

Teacher A: *"...at the start, I had a little expectation about the use of portfolios for assessment. It may improve my teaching and motivate the students to learn...however, I think I need more help and guidance in order to do better."*

Teacher C: *"I'm not sure about the value of these portfolio assessments, whether they enhance the kid's skills and attitudes or whether it is just addressing up exercise.... I prefer a clear picture about the assessments used in applied learning...training is definitely necessary if portfolio assessment is to be implemented."*

Teacher D: *"I feel that I am not familiar with the use of portfolios for assessment. If I could be given appropriate training, I believe I can do better. At least, I need a clear understanding about the purposes of applied learning."*

Teacher F: *"I have concerns about the facilities for portfolio assessment. I don't think the existing way of hosting the portfolios is good enough. We should have our own platform for hosting the portfolios..."*

Teacher H: *"I would like to know if there is training on portfolio assessment. I don't think I am comfortable enough to conduct portfolio assessment. Moreover, I need help and support ..."*

Factors useful for conducting portfolio assessment

Question 4.3 asked the participants to rate the importance of the 5 factors that helped in the portfolio assessments. Five ordered response levels were used: most important,

very important, moderately important, little important and not important. Table 5.16 presents summary of the participants' responses on the factors that would help them to conduct portfolio assessment.

Table 5.16 Reponses to factors that helped to conduct portfolio assessment

No.	Statement	Number of responses	Very important to most important
1	Samples of good portfolios	10	90.0%
3	Clear guidelines and instructions	10	90.0%
2	Marking checklists	10	80.0%
4	Demonstration and presentation of the construction process	10	80.0%
5	Proper facilities and resources (e.g. website for hosting portfolios)	10	80.0%

Results show that the majority of the participants were in agreement with the listed factors that they were important to help the conduction of portfolio assessment. Other factors considered helpful from the teachers for the use of portfolios for assessment include the following:

- *Samples of marked portfolios and comments.*
- *The school should support the teachers more on portfolio assessments, particularly for the necessary resources and dedicated platform for the hosting of portfolios.*

When discussed during the interviews about the successful factors for the implementation of portfolio assessment, teachers were not consistent in their appraisal of what kind of tools can really help them. Some teachers expressed reservations about the preparation of checklists for marking as these instruments did not really help them to express clearly about the requirements of the assessment to the students. They preferred exemplars and samples of good portfolios which could be shown to their students before they constructed their portfolios. One teacher also

reported that stronger student engagement was found after assessment criteria were explained.

Teacher C: *"I think students are not sure of the standards for a good grade in their portfolio work. I used to tell them volume of work is not the criterion and they have to produce quality...I guess they need samples of portfolios"*

Teacher D: *"I don't know which one is really helpful...but I think I need some exemplars to show to my students."*

Teacher F: *"At the beginning, the students were confused about the requirements of the portfolios and they just thought of it as other written assignments...Later, I tried to explain the assessment criteria to them and they started to think about how to develop better portfolios."*

Teacher G: *"It would be good if I can be offered more tools. However, I believe that if I can make it fun then everyone will get involved. May be we can learn from others regarding how to conduct the portfolio assessment."*

Professional development needs of teacher using portfolio assessment

Teacher professional development is considered as particularly important when there are curricular changes introduced. As portfolio assessment is a new form of assessment means introduced, it is in the interest of the study to understand about the current and future professional development needs of teacher who will implement the planned change in assessment.

Question 4.5 asked the participants to rate the 5 Table 5.17 outlines the summary of the participants' response on their professional development needs for using portfolios for assessment.

Table 5.17 Reponses to professional development needs for using portfolios for assessment

No.	Statement	Number of responses	Very important to most important
1	Clear understanding of the competency and judgement criteria	10	100.0%
3	Clear understanding of the procedure for assessment and moderation	10	100.0%
4	Knowledge on portfolios and their uses	10	80.0%
5	Proper training for the use of portfolios for assessment	10	70.0%
2	Authentic experience for assessing competency	10	60.0%

Results show that all the participants agreed that the clear understanding of the competency and procedure for assessment were important for the teachers. The majority of the participants were also in agreement with the importance of the other three statements related to knowledge, training and experience for portfolio assessment.

Other professional development needs expected from the teachers for the use of portfolios for assessment include the following:

- *Hands on workshop or seminar for the updated trend and development of on-line portfolio used in the industry.*
- *Experience sharing meeting or seminar from experienced teachers.*

When asked during the interviews about the professional development needs, most of the participants expressed that they needed clear understanding about the competency needed to be assessed by portfolios. Some teachers indicated that they needed proper portfolio-related training, particularly on the use of portfolios for assessment. One teacher suggested that peer-assessment could be built into portfolios.

Teacher A: *"...the assessment of student portfolios is interesting to do. It is an experience that surprised me. The portfolios reveal how the student is thinking. I would like to attend portfolio-related training such that I can be better prepared for the assessment."*

Teacher C: *"I believe the professional development in the area of portfolio will definitely help. However, the need for professional development that can fit with teachers' busy schedules, that draws on powerful resources often not available locally. Particularly, the professional development needs to address both the two new areas – applied learning and portfolio assessment, in local education."*

Teacher D: *"I think peer assessment could be built into portfolios much more... That's important, the students can discuss each others, evaluate, mark each others to some degree. But I don't know if it will be formally acceptable. Guidelines and procedures should be developed."*

Teacher F: *"... I am not certain about the professional development needs for portfolio assessment. It seems to me that I am lack of information about the usefulness or effectiveness of professional development. I prefer to know more about the activities of professional development available for portfolio assessment."*

Teacher G: *"Experience, both formal and informal, is the most important for professional development... Apart from accumulating experience by myself, I need experience sharing from other teachers."*

Teacher H: *"Learning about the use of technology for on-line portfolios must be included in the teachers' professional development. I believe technology can facilitate the implementation of portfolio assessment to a certain extent. Perhaps, we should have a web site that offers teachers resources for teaching, on-line portfolios hosting, samples of good portfolios, ... But, most important, we should be able to manage the technology and tools for maintaining the web site."*

Summary of Findings on Teachers' Professional Development Needs

Based on the results from the survey questionnaire and the follow up interviews, findings on how teachers perceived their constraints for using portfolio assessment and their needs for proper tools as well as professional development for the use of portfolio in assessing competency in applied learning can be summarized as follows:

1. Teachers are more concerned about the technology issues when the portfolio assessment is implemented on-line.

The responses from the questionnaire showed that teachers tended to agree with those common constraints expected when the portfolio assessment was implemented. However, while some teachers recognised these common constraints, there was no main constraint agreed by the majority of the participants as all responses were less than 60%. It was found that as the students were required to submit web-based portfolios for assessment, the majority of the teachers had expressed their concerns about technology issues for hosting the portfolios. From the open-ended question in the survey, several teachers mentioned about the technology issues related to suitable platform for hosting portfolios, backup of portfolios for recording purpose, and suitable picture format for uploading to website. Interviews with teachers confirmed this finding about their concerns related to the technology issues:

- *...training is definitely necessary...*
- *I have concerns about the facilities for portfolio assessment...*
- *It would be good if I can be offered more tools...*
- *We should have our own platform for hosting the portfolio...*
- *Learning about the use of technology for on-line portfolios must be included in the teachers' professional development.*
- *I believe technology can facilitate the implementation of portfolio assessment to a certain extent.*

2. Clarification of the criteria used in determining performance and level of success is essential

When discussed during the interviews about the successful factors for the implementation of portfolio assessment, teachers were not consistent in their appraisal of what kind of tools can really help them. Some teachers expressed reservations about the preparation of checklists for marking as these instruments did not really help them to express clearly about the requirements of the assessment to the students. They preferred exemplars and some samples of good portfolios which could be shown to their students before they constructed their portfolios.

Results from the questionnaire also indicated that most of the teachers expected samples of good portfolios as well as clear guidelines and instructions. They believed that these tools can help them to clarify the criteria used and provide a ready reference for the students to understand how their performance and level of success can be determined. Teacher also reported that stronger student engagement was found after assessment criteria were clearly explained.

3. Teachers' professional development has a significant impact on the portfolio implementation

The respondents of the questionnaire survey unanimously agreed that the clear understanding of the competency and procedure for assessment were important for their professional development needs. During the interview sessions, all of the eight respondents expressed needs of professional development in various forms:

- *...necessary resources and dedicated platform*
- *If I could be given appropriate training, I believe I can do better.*
- *I would like to know if there is training on portfolio assessment.*
- *May be we can learn from others regarding how to conduct the portfolio assessment.*
- *I would like to attend portfolio-related training such that I can be better prepared for the assessment.*
- *Particularly, the professional development needs to address both the two new areas – applied learning and portfolio assessment, in local education.*

- *Experience, both formal and informal, is the most important for professional development...*

While the teachers had expressed their various professional development needs, successful professional development opportunities for teachers should have a significant impact on the portfolio implementation. Thus, when the goal of introducing portfolio assessment is to increase students' learning and to improve their performance, the professional development of teachers should be considered as a key factor.

Summary

This part of the study aimed to explore the teachers' perceptions on the use of portfolios for assessing a student's competency as well as their professional development needs for portfolio assessment in applied learning. It attempted to model teachers' perceptions of portfolio assessment as appropriate and effective tools in assessing students' competency and professional development in relation to the relevant variables. All the teachers who taught the 2006-08 and 2007-09 cohorts of students were asked to complete a survey questionnaire and then follow up interviews were conducted with 8 out of the 10 teachers.

Results from the study revealed that portfolios provided a good means for the reflection of the learning of students to teachers. A significant indicator of this was the feedback from the teachers about the poor writing skills of their students However, with the use of visual contents like photos, pictures and videos, portfolios can give the students opportunity to excel by means of their talents in creative communication and presentation. Besides, on-line portfolios submitted by the students can allow teachers to view the works of their own students as well as students taught by other teachers which provided further reflection of the learning of students by inter-class comparisons.

Another finding about the teachers' perception is that the teachers in general agreed that portfolios were appropriate assessment activities for applied learning of

multimedia. They noticed improved completion of tasks when the students were requested to submit on-line portfolios as an assessment item. Most of the participant teachers preferred the use of portfolios to written test as a means of assessment for the students' competency in multimedia literacy and critics for multimedia products.

It is also notable that portfolio led to a more professional approach by the teachers involved. Most of the respondents acknowledged that they had certain changes of their professional practice as a result of portfolios. They became more concerned about the fairness of markings, marking criteria and consistence of marking. They were also aware of an increased need to moderate their marking decisions and tended to move away from a solo practitioner amongst the teachers.

Teachers are more concerned about the technology issues such as suitable platform for hosting portfolios, backup of portfolios for recording purpose, and suitable picture format for uploading to website, etc when the portfolio assessment is implemented on-line.

Results from the questionnaire also indicated that most of the teachers expected samples of good portfolios, and clear guidelines and instructions as these tools can help the teachers to clarify the criteria used and provide a ready reference for the students to understand how their performance and level of success can be determined. Teacher also reported that stronger student engagement was found after assessment criteria were clearly explained.

Finally, the teachers had expressed their various professional development needs related to portfolio assessment. Their responses revealed that successful professional development opportunities for teachers should have a significant impact on the portfolio implementation. In summary, when the goal of introducing portfolio assessment is to increase students' learning and to improve their performance, the professional development of teachers should be considered as a key factor.

In the next chapter, the results and findings of this study and discussions made in relation to the research questions previously stated in Chapter One are presented. These results are then discussed in terms of their limitations as well as implications

for further research and practice in assessment for Applied Learning in new senior secondary education in Hong Kong.

CHAPTER SIX

DISCUSSION AND CONCLUSION

'If you want to change student learning then change the methods of assessment'

(Brown *et al.*, 1997, p 9).

The public consultation document on applied learning courses and the subsequent report on feedback received during consultation have set the way forward about the assessment of applied learning course (EMB, 2006) - "*The applied learning within COS courses will be assessed in authentic contexts that allow students to apply their knowledge and skills. The assessment will balance the continuous assessment conducted throughout the duration of the course with end-of-module or end-of-course assessments.* In order to improve the assessment of the applied learning course of multimedia, portfolios were introduced as a form of authentic assessment to assess the competency of the students in multimedia literacy and critics. The purpose of this research was to explore the impact of that portfolio implementation from both students' and teachers' perspectives. Relevant research on competency, portfolio and authentic assessment provided the primary theoretical context.

This chapter present findings of this study and discussions made in relation to the research questions previously stated in Chapter One concerning *what* is the improvement of the students' achievement, *what* are the changes in learning attitude and satisfaction of the participants, *how* can portfolios provide evidence of the students' competency, and *what* are the needs of professional development of teachers using portfolio assessment in applied learning. These results are then discussed in terms of their limitations as well as implications for further research and practice in assessment for Applied Learning in new senior secondary education in Hong Kong. A summary in relation to the original research questions concludes the thesis.

Discussion

Based on the quantitative and qualitative results obtained in the study, the findings of this study are discussed with reference to the following research questions:

1. Does the use of portfolio assessment contribute to applied learner's achievement?

2. Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?

3. To what extent have portfolios provided a means of assessment of the students' competency?

4. What are current and future professional development needs of teachers using portfolio assessment in applied learning?

The first section of the discussion addresses the findings detailed in Chapter 4 pertaining to the research questions 1 and 2 in relation to the impact of the portfolio assessment on students' achievement and learning attitude. The next section of the discussion appraises the findings detailed in Chapter 5 relevant to the research questions 3 and 4 concerning the teachers' perception on the use of portfolios for assessing a student's competency and their professional development needs.

Assessment for Applied Learning of Multimedia

As Hong Kong moves to the new academic structure for senior secondary education commencing in 2009, elective subjects including courses of Applied Learning will be provided together with the 4 core subjects of Chinese Language, English Language, Mathematics and Liberal Studies to form the New Senior Secondary (NSS) curriculum. Students may choose up to three electives from the 20 elective subjects and applied learning courses according to their interests, aspirations and aptitudes. The main purpose of providing applied learning courses is to cope with the particular needs, aptitudes and interests of students for whom such courses are appropriate. Applied Learning courses aim to expand the range of opportunities available to school

students, enhance their employability, and prepare them better for life-long learning for further studies and/or work (see Chapter 1).

While the curriculum framework for Applied Learning was formally published by the latest document from Education Bureau (EDB) on Applied Learning Curriculum Framework (EDB, 2008), the assessment guides for the applied learning courses has not yet been developed when the study took place. Taking into the consideration the development of applied learning course and various feedbacks from stakeholders, the applied learning multimedia course has been continuously improving its curriculum and assessment methods in order to achieve the objectives of the applied learning since its first piloting in 2003. As Applied Learning aims at enabling students to understand fundamental theories and concepts through applications and practices, the learning is to be assessed in authentic contexts that allow students to apply their knowledge and skills (EMB, 2006).

There is a wealth of research devoted to define authentic context. Jonassen (1991) contended that context provides 'episodic memory cues that make the acquired knowledge more memorable' (p. 37). Within learning environments, Rogoff (1984) defined context as 'the problem's physical and conceptual structure as well as the purpose of the activity and the social milieu in which it is embedded' (p. 2). McLellan (1994) has pointed out that context in learning environments can be provided by: the actual work setting, a highly realistic surrogate of the work environment, or an anchoring context such as a video or multimedia program.

Authentic assessment is performance-based assessment that requires a student to go beyond basic recall and demonstrate significant, worthwhile knowledge and understanding through a product, performance or exhibition (Wiggins, 1989). The basic implication of the term seems to be that the assessment tasks designed for students should be more practical, realistic and challenging than what one might call 'traditional' paper-and-pencil tests (Torrance, 1995, p. 1). It is believed that authentic assessment is a more appropriate means to assess learning compared to traditional assessments such as norm-reference and standardized testing that assesses recall of factual content knowledge (Torrance, 1995; Herington & Herington, 1998; Ward & Lee, 2002).

Impact of the portfolio assessment on students' achievement and learning attitude.

One of the main reasons portfolios have been introduced in applied learning of multimedia is to develop an appropriate form of authentic assessment which can be used to assess competency of the students in multimedia literacy and critics. A review of related literature showed that portfolio was named as one suitable mean for authentic assessment (Darling-Hammond & Snyder, 2000; Cooper & Love, 2002; Hart, 1994; Karge, 1998). Particularly, portfolio assessment is seen as appropriate to vocational education since it can display products and performances that the workplace requires more than any traditional paper and pencil test (Brown, 1997).

Although the use of portfolios for assessing student competency was instituted in order to improve the assessment of applied learning in authentic contexts, the first objective of this study was to find out whether the use of portfolio assessment really contributes to learner achievement.

Research Question 1: *Does the use of portfolio assessment contribute to applied learner's achievement?*

Findings from the comparison of the students' achievement indicate that there was no significant difference between scores obtained from the two cohorts of students with or without portfolio assessment ($t=1.628$ for continuous assessment, $t=1.031$ for test, and $t=0.094$ for the overall result). Further analyses on the assessment data from the two groups of students show that, the portfolio assessment scores correlated positively, to a reasonable degree, with those of the continuous assessment ($r=0.695$) and test ($r=0.644$).

The results reveal that the introduction of portfolio assessment as one of the assessment methods did not significantly improve the students' achievement but achievement in portfolio assessment related highly to the performance of the other assessments. A possible explanation of this result is that the marks of portfolio assessment only accounts for 10% of the overall result. The change of assessment method in one of the assessment components might not impose significant difference on the students' overall achievement in the module.

Portfolio assessment offers a viable alternative to traditional, standardized, high stakes testing. It provides a means for those students at risk for academic failure to demonstrate progress within a format less restrictive and inflexible than the traditional means. The portfolio assessment method also allows the student to demonstrate specific skills within the context in which they were taught rather than within the context determined by the test constructors. Although there is no significant evidence from the study to prove that portfolio assessment contributes to learner's achievement, it is still believed that applied learning could better meet student needs and authentic requirements via the use of portfolios. While it was found that achievement in portfolio assessment related highly to the performance of the other assessment, the use of portfolios can be concluded as viable alternative to traditional assessment methods, particularly, if the applied leaning is to be assessed in authentic contexts. However, as this new approach is relatively untried, much research needs to be conducted concerning the validity and reliability of this assessment method.

According to the applied learning curriculum framework (EDB, 2008), Applied Learning course are designed according to four core principles of balance, coherence, articulation and responsiveness to provide a sound learning platform for students. The curriculum framework includes the following five areas:

- Career-related competencies
- Foundation skills
- Thinking skills
- People skills
- Values and attitudes

Particularly, the area "values and attitudes" is concerned with the students' willingness to learn through self-motivation, self-confidence and self-esteem in the process of learning, and valuing and implementing practices that promote personal growth and well being (EDB, 2008).

Research indicates that there are many stated purposes and benefits of portfolios

related to attitude and motivation of students. Willis (1996) reports that portfolio assessment offers teachers a way of motivating students and it is recognized as a critical function of assessment. Using portfolios can provide students with the opportunity to enhance their performance, develop awareness of their skills, see gaps in their learning and determine strategies to further develop (Porter & Cleland, 1995; Redman, 1994). Portfolios help students document their achievements, enhance their self esteem and develop a more positive attitude to the subject being studied (Gillespie, Ford, Gillespie & Leavelf, 1996).

Thus, it was the second objective of this study to find out whether the use of portfolio assessment can improve learners' attitude towards monitoring their learning experiences and awareness of their progress.

Research Question 2: *Does portfolio assessment improve learners' attitude towards monitoring their learning experiences and awareness of their progress?*

Results from the comparison of the student learning attitude revealed that there was no significant difference between the opinions of curriculum design (t=1.017 for the module aims, t=1.527 for the module objectives, and t=0.095 for the module contents) and experience on assessment issues (t=0.826 for the appropriateness of assessment method used, t=0.420 for the effectiveness of assessment process, and t=0.974 for the constructive feedback obtained from the teacher) from the two cohorts of students. Furthermore, the difference between the two groups of students in overall satisfaction of the teaching and learning of the module was also not significant (t=0.809).

Again, a possible explanation of this result is that portfolio assessment is only one out of the six assessment tasks required in Module I of the applied learning course. While the questionnaire was concerned about students' learning experience towards all the assessments and feedback about individual assessment was not questioned, the appraisal of the students' experience on assessment issues might not truly reflect significant difference brought by the replacement of traditional test with portfolio assessment. The teachers involved in the study in general agreed that portfolios are appropriate assessment activities for applied learning of multimedia. They noticed

improved completion of tasks when the students were requested to submit on-line portfolios as an assessment item. Perhaps further study can be carried out to directly compare different means of assessment used.

There was a significant difference (t=2.066) between the two groups of students in learning responsibility, indicating that the experimental group with portfolio assessment had a positive improvement on learning to be responsible for their learning. The survey responses on attitude towards portfolio assessment indicated that the majority of the participants of the experimental group (2007-09 cohort) had positive attitude in monitoring their learning with portfolio assessment. Responses from the interviews with teachers further confirmed this. Some teachers commented that the portfolios can provide a reflection of the students' learning and some students were motivated to take part in the portfolio assessment task as compared with other assessment tasks. Therefore, the findings of the study are in support of the literature on benefit of portfolio assessment that portfolios allow the students to take charge of their own learning (Paulson *et al.*, 1991).

One of the purposes of this study was to give assessment an importance in introducing applied learning comparable to that of traditional didactic teaching. It does not have this at present, although it has long been known that the nature of the assessment in a course has a profound effect on way that students learnt (Snyder, 1970). Brown *et al.* (1997) suggested that if one wants to change student learning then change the methods of assessment. Elton and Johnston (2002) further added that if one changes the method of teaching, but keeps the assessment unchanged, one is very likely to fail.

To successfully implement the change process in the teaching and learning practices of teachers, it is recommended that the numerous influences related to the institutions and personnel involved in the complexity of change must be taken into consideration (Huberman, 1993; Fink, 2000; Putnam & Borko, 2000; Hoban, 2002). Among these influences, teachers' perceptions were found a crucial factor in the change context as there existed complex relationships between teachers' perceptions and their actions (Doyle, 1990; Peterman, 1993; Freeman, 1993; Kelchtermans, 1993).

Teachers' perception on the use of portfolios for assessing a student's competency and their professional development needs.

All of the 10 participating teachers in this study have experience on constructing their own portfolio but most of them stated that they have not received any kind of portfolio-related training prior to commencing their portfolio construction. The majority of the participants were in agreement that their purposes of the construction of portfolio were considered important to satisfy the requirements of their professional development, study, job application and personal achievement. However, the results show that the purpose of improvement of teaching was the least important as compared with the other four purposes. Regarding the experience with the use of portfolios, most of the participants shared the common benefits and difficulties stated. In general, they thought that portfolios were useful in reflecting their competency and would continue to develop their portfolio.

As Applied Learning aims to provide students with opportunities to explore their career aspirations and orientation for career development and life-long learning in specific areas, career-related competencies becomes the important building block of the curriculum framework of Applied Learning. Specifically, the career-related competencies are defined by EDB (2008) as:

- Understanding the context of the course within the wider area of studies;
- Developing awareness and understanding of the standards and practices of one or more domains related to the course; and
- Developing and applying practical skills to demonstrate innovation and entrepreneurship.

Research has shown that competency cannot be observed directly, but can only be inferred from performance (Wolf, 1989; Gonczi *et al.*, 1993). Gonczi (1994) suggested that a holistic approach to assessing competency is likely to be more valid than and equally reliable as current methods. It is believed that authentic assessment is a more appropriate means to assess learning compared to traditional assessments such as norm-reference and standardized testing that assesses recall of factual content

knowledge (Torrance, 1995; Herington & Herington, 1998; Ward & Lee, 2002). Authentic assessment utilizes performance samples or learning activities that encourage students to use higher-order thinking skills. Wiggins (1990) stressed that assessment is authentic if it is realistic and requires that students use knowledge obtained in many ways.

The literature on portfolios in learning generally concentrates on students, with relatively little direct attention given to problems confronting teachers in assessment change. In the case of this study, the purpose of teaching of applied learning course is to facilitate students' learning, expanding understandings and empowering them with the ability to demonstrate their competencies in authentic context. However, before being able to empower students, the teachers had to change not only their beliefs about assessment and the forms that they applied, but their beliefs regarding learning itself. They needed to embrace a constructivist approach to teaching and learning, which for some meant abandoning many aspects of traditional approaches that they had employed for many years.

The implementation of the piloting of applied learning courses in the secondary schools has involved changes in the relationship between students, parents, teachers, secondary schools and course providers, particularly in the introduction of competency standards as the basis for applied learning curriculum, in the way in which curriculum is developed, and in the way in which curriculum is delivered and assessed. It can be argued, however, that the greatest effects have been upon applied learning teachers, since they have had to change their everyday practice to accommodate applied leaning. Moreover, they hold the ultimate responsibility for ensuring that applied learning achieves the stated desired outcomes. Thus, it was the third objective of this study to find out the teachers' beliefs about how the use of portfolios can provide evidence of the students' competency.

Research Question 3: *To what extent have portfolios provided a means of assessment of the students' competency?*

Results from the questionnaire survey revealed that portfolios provided a good means for the reflection of the learning of students to teachers and all the participants agreed

that the use of portfolios could collect evidence of the students' competencies. The survey responses were reaffirmed by similar responses from those 8 teachers interviewed. All of the interview respondents agreed that portfolios provided a good means to collect evidence of the students' competency on multimedia literacy and critics.

Some teachers commented that the portfolios can provide a reflection of the students' learning and some students were motivated to take part in this assessment task as compared with other assessment tasks. Besides, on-line portfolios submitted by the students can allow teachers to view the works of their own students as well as students taught by other teachers which provided further reflection of the learning of students by inter-class comparisons.

Another finding about the teachers' perception is that the teachers in general agreed that portfolios were appropriate assessment activities for applied learning of multimedia. They noticed improved completion of tasks when the students were requested to submit on-line portfolios as an assessment item. Most of the participant teachers preferred the use of portfolios to written test as a means of assessment for the students' competency in multimedia literacy and critics for multimedia products.

While this study began with a focus on assessing the competency of the students in multimedia literacy and critics, the portfolio implementation revealed some issues facing teachers as they assessed their students' competency.

Writing Skill Barriers

Teachers realised that students should be able to communicate adequately if they have to demonstrate their competency of critics. A significant barrier of this was the poor writing skills of the students if they are assessed by traditional test methods with the use of pencil and paper. However, with the use of visual contents like photos, pictures and videos, portfolios can give the students opportunity to excel by means of their talents in creative communication and presentation. Teachers commented that the students' competency in multimedia literacy and critics can better be assessed with the use of portfolios.

Catering for Different Ability Levels

In catering for all ability levels across the multiple intelligences, it was important to create tasks which challenged but did not frustrate students. A few teachers expressed that they would not recommend portfolios for use with lower ability classes. However, it was agreed that students of lesser ability in writing skills were able to represent their competencies in multimedia critics through portfolio tasks. Teachers need to devise strategies that enable students of different abilities to present their ideas that recognised differences in ability in writing skills.

Teacher Workload

When asked during the interviews to describe an example of the major problem teachers experienced in conducting portfolio assessment, most respondents said they had extra work load as it was the first time to implement the portfolio assessment. Some teachers believed that these over loadings were the main problem in conducting portfolio assessments. They need time to learn about new assessment concepts, develop and adapt, trial and implement those which they believe are worthy of such investment in advancing authentic assessment. However, as they became more experienced with the portfolios, they and in turn their students became much more adept and efficient, reducing time taken accordingly.

Storage Platform and Accessibility

Storage platform and accessibility of on-line portfolios were another strong teacher concern. Some teachers expressed their concerns about the platform used for hosting the portfolios. They believed that the platform should be dedicated to the course and under their control instead of a public platform. From the open-ended question in the survey, several teachers mentioned about the technology issues related to suitable platform for hosting portfolios, backup of portfolios for recording purpose, and suitable picture format for uploading to website. Interviews with teachers further confirmed this finding about their concerns related to the technology issues.

Support for Portfolio Implementation

Both the results from questionnaire and interviews highlighted the need for teachers to receive support for portfolio implementation. They preferred exemplars and some samples of good portfolios which could be shown to their students before they constructed their portfolios. Most of the teachers expected samples of good portfolios as well as clear guidelines and instructions. They believed that these tools can help them to clarify the criteria used and provide a ready reference for the students to understand how their performance and level of success can be determined. Teacher also reported that stronger student engagement was found after assessment criteria were clearly explained.

A review of literature on the teachers' role in using portfolios for assessment exposes those issues confronting teachers as they attempt to realign their teaching and learning programs in order to embrace assessment of competency through portfolios. Evidences from literature also show that the professional development of teachers is a key factor in ensuing that changes or reforms are effective. Particularly, successful professional development opportunities for teachers have a significant positive effect on students' performance and learning. Thus, it was the fourth objective of this study to find out the needs of professional development of teachers using portfolio assessment in applied learning.

Research Question 4: *What are current and future professional development needs of teachers using portfolio assessment in applied learning?*

Studies (Huberman, 1989; Goodson, 1992) reveal that teachers of similar age and sex share similar experiences, perceptions, attitudes and concerns. As they get more advanced in years, the nature of their motivation and commitment develop or change in a predictable pattern as the aspects of this conceptualization of teachers' life and career cycles are common. In general, teachers are characterized by the stages of their professional expertise and experiences.

The findings from the study did not reveal any significant differences among the participants in different age groups and genders. This may be caused by the relatively

small numbers of participants. However, it is important to point out that the majority of participants in the study are teachers aged below 35 (90.0%). They are less experienced and junior teachers and professional development can assist them build confidence in developing and working with the revised pedagogy.

It is notable that portfolio led to a more professional approach by the teachers involved. Most of the respondents acknowledged that they had certain changes of their professional practice as a result of portfolios. They became more concerned about the fairness of markings, marking criteria and consistence of marking. They were also aware of an increased need to moderate their marking decisions and tended to move away from a solo practitioner amongst the teachers. Portfolios had motivated some teachers to change aspects of their teaching and assessment practice, and some teachers were enthusiastic about portfolios

The teachers had expressed their various professional development needs related to portfolio assessment. Their responses revealed that successful professional development opportunities for teachers should have a significant impact on the portfolio implementation. A further concern was the lack of knowledge or training necessary for implementing portfolio-based student assessment. In order for this form of assessment to be effective, teachers must be trained in the various aspects of the approach. If teachers are simply given directions to implement portfolio assessment and mandated to do so without the proper preparation, it is doomed to failure. Just as teachers were trained in their specific discipline and/or content area, they must also have training in the portfolio approach to assessment. Once trained and the plan implemented, there must also be follow-up training sessions through staff development. Consequently, the following professional development needs are considered essential for teachers using portfolio assessment in applied learning.

Increased Understanding of Competency Standard

Results show that all the participants agreed that the clear understanding of the competency and procedure for assessment were important for the teachers. While career-related competencies are regarded as building block of the curriculum framework of Applied Learning, the teachers should have a clear understanding about

the related competency requirements such that appropriate forms of assessment could be used. Career-related competencies are representing the industry benchmarks for the skills, knowledge and attributes required to perform a job at a certain level. Traditional form of professional development including short seminars, workshops and courses on understanding of competencies and assessment criteria are essential for the teachers to implement the portfolio assessment.

Portfolio-related Training

All of the 10 participating teachers in this study have experience on constructing their own portfolio but most of them stated that they have not received any kind of portfolio-related training prior to commencing their portfolio construction. Regarding the experience with the use of portfolios, most of the participants shared the common benefits and difficulties stated. In general, they thought that portfolios were useful in reflecting their competency and would continue to develop their portfolio. Some teachers indicated that they needed proper portfolio-related training, particularly on the use of portfolios for assessment.

New Technology used for On-line Portfolios

As on-line portfolios are used for the assessment, teachers must be proficient in knowledge and skills on how to implement technology in the process of uploading portfolios, storage and backup, as well as providing feedback to students. Although all of the teachers who teach multimedia do have access to new technology, especially computers, the challenge is to learn how to use it effectively. With technology rapidly changing, teachers need to focus on learning about and developing skills related to technology, and deepening their content knowledge.

Observations of Good Practice and Experience Sharing

It is benefit to teachers if a professional development programme can offer teachers the opportunity to observe colleagues who have been recognized for their expertise and excellence in portfolio assessment. In this way, teachers have the opportunity to learn and reflect on the knowledge, skills and attitudes that excellent teachers

implement in the classroom. More important, teachers need to observe good practice and share experience with their peers.

Development of Teaching Portfolios

Research has shown that teaching portfolios can support teachers' professional development as they provide an opportunity for teachers to reflect on their own work, goals, activities in and out of the classroom. The majority of the participants were in agreement that their purposes of the construction of portfolio were considered important to satisfy the requirements of their professional development, study, job application and personal achievement. However, the results show that the purpose of improvement of teaching was the least important as compared with the other purposes such as learning portfolio and employment portfolio. As portfolios are to be used for assessing students' competency, the development of teaching portfolios will help the teachers to develop and monitor their own professional development.

Summary of Findings

This study was undertaken to explore the impact of portfolio implementation in applied learning of multimedia from both students' and teachers' perspectives. As a result of the comparison of the students' achievement and learning experience between two cohorts of students with and without portfolio assessment, a number of major points in the existing literature were supported and confirmed in a local context. Further findings which supplemented the existing literature have been highlighted throughout the discussion of study results with many emphasized in the responses to the research questions.

From the results of the teacher questionnaire survey and interviews, perceptions and impact upon the teachers involved introduced numerous issues and discussion points on competency standards and suitable means of their assessment. Additional to the valuable intangibles that emerged from the study in the form of new understandings were what became the keys to the teachers' professional development needs. In conclusion, four findings about the use of portfolios in assessing competency in

applied learning of multimedia are presented. These findings hold for the setting of the study and may be generalized to other implementations should those settings not vary significantly in the key variables of teacher and student.

First finding: Portfolios can be a form of authentic assessment for applied learning.

While the current forms of assessment used in applied learning of multimedia are limited to traditional assessment methods like written tests and skill tests, the portfolio implementation in this study sought to serve as a form of authentic assessment to assess the competency of the students in multimedia critics. The findings of the study revealed that portfolio assessment offers a viable alternative to traditional, standardized, high stakes testing. It provides a means for those students at risk for academic failure to demonstrate progress within a format less restrictive and inflexible than the traditional means. The portfolio assessment method also allows the student to demonstrate specific skills within the context in which they were taught rather than within the context determined by the test constructors. Although there is no significant evidence from the study to prove that portfolio assessment contributes to learner's achievement, it is still believed that applied learning could better meet student needs and authentic requirements via the use of portfolios. While it was found that achievement in portfolio assessment related highly to the performance of the other assessment, the use of portfolios can be concluded as viable alternative to traditional assessment methods, particularly, if the applied leaning is to be assessed in authentic contexts. However, as this new approach is relatively untried, much research needs to be conducted concerning the validity and reliability of this assessment method.

Second finding: Completing a portfolio benefits applied learning students.

The study revealed that the students found portfolios to be appropriate and acceptable activities in learning multimedia. Teachers noticed improved performance by their classes, both in the improved completion of tasks and the learning responsibility the students have in their work. On-line portfolios also incorporated a structure that permitted inter-class comparison, enabling a reflection of teaching and learning that was of interest to students as well as teachers.

Results showed that the students were not consistent in their appraisal of time and effort spent for preparation of portfolio. Although more than half of the participants agreed or strongly agreed that it took too much of their time to prepare a portfolio (53.4%), the majority of the participants (71.1%) were in agreement that it was worth the effort to prepare the portfolio.

There was a significant difference (t=2.066) between the two groups of students in learning responsibility, indicating that the experimental group with portfolio assessment had a positive improvement on learning to be responsible for their learning. The survey responses on attitude towards portfolio assessment indicated that the majority of the participants (65.0%) of the experimental group (2007-09 cohort) had positive attitude in monitoring their learning with portfolio assessment. Responses from the interviews with teachers further confirmed this. Therefore, the findings of the study are in support of the literature on benefit of portfolio assessment that portfolios allow the students to take charge of their own learning.

Third finding: Portfolios can improve teacher understanding of competency and its assessment.

An important finding of this study was that portfolios led to a more professional approach by the teachers involved. Most of the respondents acknowledged that they had certain changes of their professional practice as a result of portfolios. They became more concerned about the fairness of markings, marking criteria and consistence of marking. Some of the teachers expressed that they compared the responses of their classes and showed exemplary student work to each other informally. They were aware of an increased need to moderate their marking decisions and tended to move away from a solo practitioner amongst the teachers.

Portfolios also led to a need for the teachers to improve their understandings of competency ant its assessment. A significant indicator was that all the participants agreed that the clear understanding of the competency and procedure for assessment were important for the teachers. The findings of the study revealed the teachers' concerns about the use of portfolios for assessing competency such as writing skills

barriers, catering for different ability levels, teacher workload, storage platform and accessibility, and other supports for the portfolio implementation.

Fourth finding: Teacher professional development is essential for portfolio implementation.

The findings of the study revealed that successful professional development opportunities for teachers should have a significant impact on the portfolio implementation. A further concern was the lack of knowledge or training necessary for implementing portfolio-based student assessment. In order for this form of assessment to be effective, teachers must be trained in the various aspects of the approach. If teachers are simply given directions to implement portfolio assessment and mandated to do so without the proper preparation, it is doomed to failure. Just as teachers were trained in their specific discipline and/or content area, they must also have training in the portfolio approach to assessment. Once trained and the plan implemented, there must also be follow-up training sessions through staff development.

The teachers involved in the study had expressed their various professional development needs related to portfolio assessment and these include increased understanding of competency standard, portfolio-related trainings, new technology used for on-line portfolios, observations of good practice and experience sharing, and development of teaching portfolios.

Limitations of the Study

There were several drawbacks of this study that should be noted in order to facilitate further research in the area of portfolio assessment and applied learning. The first limitation of the study was the possible differences that were not measured between the two groups of students, experimental group (2007-09 cohort) and control group (2006-08 cohort). While equivalence of groups was checked in terms of demographics of the students and on their motivation of learning multimedia, it is still impossible to know for sure about the equivalence of their ability in learning multimedia.

Specifically, as the study had compared the assessment scores of the two cohorts of students to find out the difference, there is limitation concerned with the uncertainly of the homogeneity of the two groups concerned. However, as the analysis showed that there was no significant difference between the learners' achievement in the assessment scores from continuous assessments and tests, it did provide certain evidence that the two groups of students were not significantly different in terms of ability in learning multimedia. Perhaps, the research design could be improved if the results of the other two modules of the course, i.e. Module II and Module III, can be collected and compared to further explore the impact of the introduction of the portfolio assessment on learners' achievement. Also, had this study been extended over a period of one cohort, students' achievement in portfolio assessment can be compared.

The second limitation is the piloting of Applied Learning course. While the applied learning multimedia course of this study is one of the Applied Learning courses being piloted, the assessment framework has not yet been developed to ensure the fairness. Particularly, the current portfolio assessment method used by the course has not been test for validity and reliability. According to the consultation document from EMB (2006), it is recommended that Hong Kong Examinations and Assessment Authority (HKEAA) will moderate the assessments to ensure that the standards are consistent among different classes and across the years. While the Applied Learning courses will be formally offered to senior secondary students in the academic year 2010/11, it is expected that the assessment scheme of each Applied Learning subject will then be available by 2010. The document *Applied Learning Curriculum and Assessment Guide (Senior Secondary Level)* (2009) recommends that assessment tasks be designed so that they can assess a wide range of student learning, from reflecting the achievement of expected learning outcomes to demonstrating the ability to transfer skills acquired to a new context. Besides, Common Assessment Tasks will be introduced which constitute a core part in the assessment for each Applied Learning subject in order to facilitate comparability of assessment results across different classes of the same Applied Learning. It is believed that with the established assessment scheme, further study can then be undertaken to further explore the effective use of portfolios for assessment.

A third limitation concerned with the data collected for the assessment scores. It was

reported that incompletion of assessment tasks was quite common for some students. As they had not finished all the assessment tasks, the computation of average assessment scores of the cohort was affected as incomplete assessment led to a zero mark for that particular assessment task. Particularly, some of the students may not have finished the portfolio assessment tasks completely which biased the result of the post test questionnaire survey. The current study has not discarded those assessment scores with incomplete assessment.

A fourth limitation was the time limitation and the restriction of resources for the study of attitudinal change of students. The questions for the satisfaction questionnaire on portfolio assessment were derived from questionnaire of other previous studies on portfolio assessment but were not tested for senior secondary students in Hong Kong. Besides, open-ended questions were not available such that only quantitative data were collected for analysis. A qualitative method such as, in-depth interview or classroom observations might have been more helpful to obtain more objective and reliable data to triangulate the findings. Moreover, a longitudinal approach in which attitudinal changes are monitored could provide a clear view of how learners' attitude change towards monitoring their learning experiences and awareness of their progress.

A final limitation is the small sample size of applied learning teachers – only ten teachers were available for the data collection of the teachers' perception and professional development needs. Also, the majority of the participating teachers had only 1-3 years of teaching experience. The responding behaviour observed in the study may not be applicable in the educational environment of secondary schools, where teaching experience may play a part in affecting students' performance as a result of portfolio assessment. Moreover, as the participating teachers in teaching the two piloting cohorts of applied learning course of this study were mostly from IVE, the findings can hardly be generalizable to all teachers of applied learning course as the course is designed to be taught by teacher with relevant academic qualification and working experience in multimedia production but not restricted from IVE or secondary school. There may have different perceptions between the two types of teachers on competency assessment and professional development needs. Thus, the need for a replicated study with more representative sample from both types should be further investigated. Finally, time was also a limitation for the study with teachers. Time did not allow every teacher involved for questionnaire survey to be interviewed. Because the sample size was

relatively small, the need for interview with all participating teachers would be essential.

Suggestions for Future Research

The findings of this study provide some implications for the use of portfolios for assessing competency in applied learning of multimedia. The major implication is that portfolios can be a form of authentic assessment for applied learning. This study shows an encouraging picture that students' process of portfolio compilation does enhance student motivation and it carries pedagogical implications for teachers. While it was found that achievement in portfolio assessment related highly to the performance of the other assessment, the use of portfolios can be concluded as viable alternative to traditional assessment methods, particularly, if the applied leaning is to be assessed in authentic contexts. However, if portfolio assessment were to become an integral part of the applied learning curriculum, much research needs to be conducted concerning the validity and reliability of this assessment method.

In addition, the implications of portfolio assessment for students can certainly not be ignored. By fostering a reflective attitude towards learning, portfolio assessment is capable of empowering students as they begin to think about themselves and their learning. The findings of this study are in support of the literature on benefit of portfolio assessment that portfolios allow the students to take charge of their own learning.

A secondary implication of this study is related to the involvement of teachers in the change of assessment method used. In seeking to embrace authentic assessment in applied learning, the scarcity of policy and support made it difficult for the teacher to implement the change. However, an important finding was that portfolios led to a need for the teachers to improve their understandings of competency ant its assessment. The findings of the study also revealed that successful professional development opportunities for teachers should have a significant impact on the portfolio implementation.

Given the mentioned limitations in the previous section, it would be interesting to see further studies in the area of portfolio implementation in applied learning. Besides, improvements could be made if replications of this study are to be conducted. The following questions are meant for teacher educators, school administrators and policy-makers who are interested in conducting further research on the use of portfolios for assessment with the change efforts in the development of applied learning course.

- What is the inter-rater reliability of assessors' judgement on portfolios and how can it be improved?

Portfolios were primarily introduced to assess performance in authentic contexts and encourage learners to reflect on their performance. They are subjective documents that include not just descriptive accounts but reflections thereon. This makes them essentially individual and unique documents. Assessment approaches that attempt to measure the learning processes shown by portfolios require a different set of educational values that recognize the role of personal and professional judgements on the part of the learner. When portfolios are used for summative rather than formative assessment, the psychometric qualities must meet stringent requirements, particularly in terms of reliability. Future studies may examine the reliability of portfolio assessment and ask which are important to improve the reliability.

- Does portfolio assessment have greater predictive value about how students will actually perform in advanced study or related industries?

Previous studies have found that portfolios are seen as having the potential to offer "authentic" assessment which in turn is likely to provide predictive information about how a student will perform after moving beyond the assessment (*Editorial* 1998; LeMahieu, Gitomer and Eresh 1995; Murphy 1994). While applied learning aims to develop students the career-related competencies that equip them for more advanced study or future career development, further research in this area may examine the correlations between achievement in portfolio assessment and subsequent performance.

- How does the teacher professional development impact the implementation of

portfolio assessment?

The findings of the study revealed that successful professional development opportunities for teachers should have a significant impact on the portfolio implementation. A further concern from the participant teachers of the study was the lack of knowledge or training necessary for implementing portfolio-based student assessment. Teacher knowledge and skills in portfolios and assessments must be expanded through in-service training. Future study may compare the performance of students taught by teachers with or without proper portfolio-related professional development.

Conclusion

The current attempts of introducing applied learning courses in new senior secondary curriculum may serve as a lesson for policy-makers and educators. Though it may be too early to conclude whether the implementation approaches chosen are adequate or not, the fact that there are numerous problems and difficulties which are hindering the implementation process cannot be denied. Particularly, the overall curriculum and assessment framework of applied learning have not been finalized until the very later stage of piloting.

Considerable consultation has been conducted to assess the impact of introducing applied learning courses into the senior secondary education, curriculum design of applied learning courses, and the recognition of and quality assurance for applied learning (EMB 2006). Prior to this study, no such research had been carried out in Hong Kong on the use of authentic assessment methods in applied learning. This study attempted to explore the impact of the portfolio implementation from both students' and teachers' perspectives.

Despite the finding that the introduction of portfolio assessment as one of the assessment methods did not significantly improve the students' achievement, the main contribution of this study is that it was evident that completing a portfolio benefits

applied learning students and their portfolio compilation process can lead to an enhancement in student motivation towards learning.

The results of the study also provided support that portfolios can be a form of authentic assessment for applied learning. However, to secure a fair and complete picture of a student's performance, teachers should use a variety of strategies over a period of time and in different situations. A balanced assessment program includes multiple assessment strategies that are aligned with specific learner outcomes so that students can demonstrate what they understand, know, and can do. No one method or strategy of assessing student performance is sufficient as each assessment task has advantages and disadvantages. The key to meaningful assessment is to match student learner outcomes with an appropriate assessment strategy.

Finally, the results suggested that teacher professional development should have a significant impact on the portfolio implementation. Most of the participating teachers acknowledged that they had certain changes of their professional practice as a result of portfolios. They had expressed their various professional development needs related to portfolio assessment and these include increased understanding of competency standard, portfolio-related trainings, new technology used for on-line portfolios, observations of good practice and experience sharing, and development of teaching portfolios.

This study contributed to the literature of new senior secondary education, specifically the development of applied learning courses. To the extent that this study helped identify perceptions of the portfolio assessment by students and teachers, this study also contributed to the teaching and learning using portfolios. It is hoped that the encouraging findings of this study would shed light on the multifaceted benefits of portfolio assessment and would provide sound justifications for its integration into the applied learning curriculums.

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APPENDICES

Appendix A: Course End Survey for Applied Learning Courses offered by Vocational Training Council

VTC 應用學習課程(2008-2010)
學生意見調查
(教育局公開招生模式適用)

OP

學生資料			
就讀課程: (請將適當空格內填上✓)			
☐ 酒店營運	☐ 西式食品製作 (廚藝製作分流)	☐ 中小企實用電腦會計	就讀班別：
☐ 創意多媒體	☐ 西式食品製作 (包餅製作分流)		
☐ 創新產品設計	☐ 形象設計 (時裝形象設計分流)		
☐ 電影及錄像	☐ 形象設計 (髮型設計分流)		

學員指引

1. 本意見調查旨在收集同學之個別意見。填寫問卷時，請根據本身觀察與判斷作出評分 (請在合適的方格內填上✓) 及提出意見，無須與同學討論。
2. 本意見調查以不記名方式進行，所有資料將會保密。

第一部分 – 對課程內容的意見

		10 = 非常同意									1 = 非常不同意
		10	9	8	7	6	5	4	3	2	1
1.	教材對我的學習有幫助。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.	課程內容實用而有趣。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.	我能掌握教學與教材內容。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.	習作及測驗與所學有關。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5.	此課程安排的功課量適中。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.	習作的批改對我的學習有幫助。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.	總括而言，我對課程內容感到滿意。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

第二部分 –對教學的意見

		10 = 非常同意									1 = 非常不同意
		10	9	8	7	6	5	4	3	2	1
8.	老師講解清晰，配合課程內容。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9.	老師的評語對我的學習有正面幫助。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10.	老師鼓勵學員發問及參與課堂活動。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.	課堂的管理有效，學習氣氛良好。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12.	任何學業上的問題，老師都會關心及幫助我。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.	學員的意見及建議受到重視及獲得適當的跟進。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.	在課堂時間以外，我也能透過不同渠道與老師討論學習上的問題。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15.	總括而言，我對教學感到滿意。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

第三部分 – 對教學設施與環境的意見

(只適用於 VTC 轄下之中心或學院，不包括學校本身所提供之設施)

		未曾使用	10 = 非常滿意									1 = 非常不滿意
			10	9	8	7	6	5	4	3	2	1
16.	圖書館資源、設施及服務	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17.	課室設施	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18.	與課程相關之特別設施 (如多媒體創作室、髮型設計室、訓練廚房及其他資源中心等)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19.	電腦設施，例如電腦、互聯網及內聯網	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20.	總括而言，我對設施與環境感到滿意。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

第四 –對教學的意見

		10 = 非常同意									1 = 非常不同意
		10	9	8	7	6	5	4	3	2	1
21.	此課程提升了我解決問題的能力。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22.	此課程提升了我與人共事的能力。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23.	此課程提升了我的溝通及表達技巧。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24.	此課程加深我對有關行業的認識，有助我思考個人未來發展。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25.	此課程提升了我尋找、處理及應用資訊的技巧。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26.	理論課與實習課的比重安排妥善。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27.	此課程的教學活動多元化並配合課題。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28.	此課程採用多種評核方法，讓我更了解學習進度。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29.	「生活技能教育日營」對我個人突破及建立團隊精神有幫助。 (如沒有出席上述日營，無須回答本問題)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30.	整個課程派發兩次成績報告(即中四學年及課程完結時)的安排合適。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31.	上課時間安排恰當。 如不同意或非常不同意，你的建議是 _____ _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32.	暑假上課之安排（如時間及日期等）恰當。 (如課程沒有暑假上課安排，無須回答本問題) 如不同意或非常不同意，你的建議是 _____ _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
33.	整體而言，我滿意此課程。	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

第五部份：請分享你的意見
34. 此課程最好的地方是什麼？請詳細說明。
35. 此課程可以在什麼地方加以改善？請詳細說明。
36. 你會介紹本課程給你的同學嗎？為什麼？
37. 你對此課程的其他意見。

~完~

~ 多謝你對本課程提供意見 ~

Appendix B: Questionnaire Survey on Applied Learning of Multimedia (Student)

Questionnaire Survey on Applied Learning of Multimedia
多媒體應用學習問卷調查

This is a survey to elicit students' motivation and previous experience of learning multimedia content software. The findings of the survey will be used as suggestions for improving the teaching and learning of the applied learning course of Creative Multimedia Studies.
本問卷旨在了解學生曾否學習使用多媒體軟件及評估其學習動機。調查結果及有關意見將用作改善/提升創意多媒體應用學習課程的教學質素。

Please put a tick √ in the appropriate box or write on the blank.
請於適當位置填上√號或於空白位置上填寫資料。

I. Personal Particulars 個人資料

1.1 Sex 性別: ☐ Male 男 ☐ Female 女

1.2 Age 年齡:

1.3 Your school is located at: ☐ HK 香港 ☐ Kowloon 九龍 ☐ NT 新界
貴校位於:

1.4 Medium of instruction of your school is: ☐ English 英語 ☐ Chinese 中文
貴校所選用的教學語言是:

1.5 Do you have a personal computer at home? ☐ Yes 有 ☐ No 沒有
閣下在家中擁有個人電腦嗎？

1.6 How could you access the Internet at home? ☐ Broadband ☐ 56K Modem ☐ No access
閣下在家中如何或能否進入互聯網? 寬頻上網 窄頻上網 不能上網

II. Evaluation of Learning Motivation 學習動機評估

No. 題號	Statement 陳述	strongly agree 非常同意	agree 同意	neutral 不肯定	disagree 不同意	strongly disagree 非常不同意
2.1	From what I know, learning multimedia is interesting 本人認爲修讀多媒體課程很有趣					
2.2	I expect that studying multimedia will be rewarding 本人期望報讀多媒體課程可獲益良多					
2.3	I have confidence to learn multimedia well 本人有信心可從學習中獲取多媒體的知識					
2.4	I want to learn multimedia because I like computer animation 本人喜歡電腦動畫，所以想修讀多媒體課程					
2.5	I want to learn multimedia because I like computer game本人喜歡電腦遊戲，所以想修讀多媒體課程					
2.6	I want to learn multimedia because I like video or visual effects 本人喜歡錄像或視覺特效，所以想修讀多媒體課程					
2.7	People around me encourage me to learn multimedia 身邊的朋輩鼓勵本人修讀多媒體課程					
2.8	Learning different multimedia content software is useful 學習使用不同的多媒體軟件很有用					
2.9	I have to obtain the award which is equivalent to a pass of HKCEE subject 本人需要獲取等同香港中學會考合格成績的資格					
2.10	I want to further study multimedia related course in post-secondary school 本人希望將來在大專院校進修有關多媒體的課程					

- Thank you for your cooperation多謝合作 -

Appendix C: Satisfaction Questionnaire for Applied Learning

Questionnaire Survey on Applied Learning of Multimedia

(2007-09 Cohort)

多媒體應用學習問卷調查
(2007-09 年度)

This is a survey to elicit students' learning experience of Module I – Multimedia Fundamentals. The findings of the survey will be used as suggestions for improving the teaching and learning of the applied learning course of Creative Multimedia Studies.
本問卷旨在了解學生學習單元 I – 多媒體基礎的經驗及感受。調查結果將用作改善/提升創意多媒體應用學習課程的教學質素。

Please put a tick √ in the appropriate box or write on the blank.
請於適當位置填上√號或於空白位置上填寫資料。

I. Evaluation of Portfolio Assessment
學習歷程檔案評核的評估

No. 題號	Statement 陳述	strongly agree 非常同意	agree 同意	neutral 不肯定	disagree 不同意	strongly disagree 非常不同意
1.1	The teacher has guided sufficiently in preparing my portfolio. 老師給予適當的指導，讓我完成在網誌上的學習歷程檔案。					
1.2	Preparing a portfolio has helped me to understand the topics/content of this course. 製作學習歷程檔案幫助我理解課程的大綱/內容。					
1.3	Preparing a portfolio has helped me to practice the skills learnt in this module. 製作學習歷程檔案可以讓我實習本單元所教授的技巧。					
1.4	It takes too much of my time to prepare a portfolio. 我需要大量時間完成網誌上的學習歷程檔案。					
1.5	It is worth the effort to prepare a portfolio. 我認爲完成學習歷程檔案所需的時間是值得的。					
1.6	I like to work on my portfolio on my own. 我會獨力完成個人網誌上的學習歷程檔案。					
1.7	I like to share the work in my portfolio with my classmates. 我會與班上同學分享我的網誌上的學習歷程檔案。					
1.8	I like to put work in my portfolio that is relevant to the study. 我會把與課程有關的內容放進學習歷程檔案。					
1.9	I like to present the contents of my portfolio to other people. 我樂意與其他人分享我的學習歷程檔案。					
1.10	I would like to know what criteria are used to assess my portfolio. 我想了解學習歷程檔案的評核準則。					

II. Evaluation of Learning Experience on Module I (Multimedia Fundamentals)
單元 I – 多媒體基礎的學習經驗評估

No. 題號	Statement 陳述	strongly agree 非常同意	agree 同意	neutral 不肯定	disagree 不同意	strongly disagree 非常不同意
2.1	This module gave me a good introduction to the field of multimedia. 我從這單元獲取豐富的多媒體基礎知識。					
2.2	The objectives of the module were clear. 本單元的教學目標清晰。					
2.3	There was a good balance between theoretical and practical concerns. 本單元的理論與實踐並重。					
2.4	The methods of assessment used were appropriate for the subject. 本單元的評核方法適當。					
2.5	The assessment process used in this subject helped me to learn the material. 本單元所採用的評核方法對我的學習有幫助。					
2.6	The teacher gave me constructive feedback on my assessed work. 老師對我的習作批改給予建設性的意見。					
2.7	I learned to feel responsible for my own learning. 我學懂重視及關心自己的學習成果。					
2.8	Overall I was satisfied with the teaching and learning of this module. 整體而言，我滿意本單元的教學方法。					

- 多謝合作 Thank you for your cooperation

Appendix D: Questionnaire Survey on Applied Learning of Multimedia (Teacher)

Questionnaire on Applied Learning of Multimedia

This is a questionnaire survey to elicit teachers' opinion on the use of portfolios for accessing a student's competence and their professional development needs. The findings of the survey will be used as suggestions for improving the teaching and learning of the applied learning course of Creative Multimedia Studies. All the information provided in this questionnaire including your particulars will be kept confidential.

Please put a tick √ in the appropriate box or write on the blank.

I. Personal Particulars

1.1 Gender: ☐ Male ☐ Female

1.2 Age: ☐ under 25 ☐ 25 – 34 ☐ 35 – 44 ☐ 45 and over

1.3 Highest qualification attained: ☐ Bachelor ☐ Master ☐ Doctorate

1.4 Do you have formal qualification in education? ☐ Yes ☐ No

1.5 Teaching experience in years: ☐ less than 1 ☐ 1 - 3 ☐ 4 -6 ☐ over 6

1.6 Teaching experience of Applied Learning (Multimedia) in years: ☐ less than 1 ☐ 1 - 3 ☐ 4 -6 ☐ over 6

1.7 Multimedia related industrial working experience in years: ☐ less than 1 ☐ 1 - 3 ☐ 4 -6 ☐ over 6

II. Experience with the Use of Portfolios

2.1 Do you have experience on constructing your own portfolio?

☐ No (please go to Section III)

☐ Yes

2.2 Have you received any kind of portfolio related training prior to commencing your portfolio construction?

☐ No

☐ Yes

If yes, please specify the form of training and comment on the usefulness:

_____

_____

_____

_____

2.3 The purpose of the construction of portfolio is:

No.	Statement	most important	very important	moderately important	little important	not important
1	To fulfill the requirements of your own study					
2	To fulfill the requirements of your professional development					
3	To improve your teaching					
4	To keep track of your own works and personal achievements					
5	To apply for a job or higher official ranking					

2.4 Your opinion in constructing your own portfolio:

No.	Statement	strongly agree	agree	neutral	disagree	strongly disagree
1	Compiling a portfolio has made me more confident					
2	Compiling a portfolio has made me more organized in my approach to present myself					
3	Compiling a portfolio has motivated me					
4	Compiling a portfolio put great pressure on me					
6	Compiling a portfolio has increased my workload					
7	I am lack of proper training to construct my portfolio					
7	The content of the portfolio is sufficient in reflecting my competence					
8	I would like to continue to develop on my portfolio in future					

III. Use of Portfolios for Assessing Students' Competence in Applied Learning

3.1 Benefits expected from the use of portfolios for assessment:

No.	Statement	strongly agree	agree	neutral	disagree	strongly disagree
1	Collect evidence of the students' competence					
2	Reflect on my teaching and student learning					
3	Better understand students' learning					
4	Motive students to learn					
5	Improve the current assessment methods					

3.2 Other benefits? Please specify: _____

_____

_____

_____

_____

_____

_____

3.3 Problems with the use of portfolios for assessment

No.	Statement	strongly agree	agree	neutral	disagree	strongly disagree
1	No guarantee for the originality of the portfolio content					
2	Lack of acceptable standard in portfolio evaluation					
3						
4						
5						

3.4 Other problems? Please specify: _____

_____

_____

_____

_____

_____

_____

_____

3.5 Please rate the appropriateness of the following assessment methods for providing evidence of the students' competence:

No.	Statement	most important	very important	moderately important	little important	not important
1	Written Assignments					
2	Written Tests					
3	Skill Test					
4	Portfolios					
5	Projects					

IV. Professional Development Needs for Portfolio Assessment in Applied Learning

4.1 Please rate the following constraints in conducting portfolio assessment:

No.	Statement	most important	very important	moderately important	little important	not important
1	Lack of guidance and support					
2	Lack of proper training					
3	Unclear understanding of the purposes					
4	Inadequate knowledge of portfolios and their uses					
5	Limited facilities for portfolio					

4.2 Other constraints? Please specify: _____

_____

_____

_____

_____

_____

4.3 Please rate the following factors that helped in the portfolio assessment:

No.	Statement	most important	very important	moderately important	little important	not important
1	Samples of good portfolios					
2	Marking checklists					
3	Clear guidelines and instructions					
4	Demonstration and presentation of the construction process					
5	Proper facilities and resources (e.g. website for hosting portfolios)					

4.4 Other suggestions? Please specify: _____

_____

_____

_____

_____

_____

_____

_____

4.5 Please rate the following professional development for the use of portfolio in assessing competence in applied learning:

No.	Statement	most important	very important	moderately important	little important	not important
1	Clear understanding of the competence and judgement criteria					
2	Authentic experience for assessing competence					
3	Clear understanding of the procedure for assessment and moderation					
4	Knowledge on portfolios and their uses					
5	Proper training for the use of portfolios for assessment					

4.6 Other professional development needs? Please specify: _____

_____

_____

_____

_____

_____

_____

_____

- Thank you for your cooperation -

Appendix E: Interview Guide Questions

Interview Guide Questions

The following questions refer to the experience of the use of portfolio for assessing competence of students in applied learning.

1. What does "portfolio" mean to you?

2. Give an example of something that you would consider the major improvement made on the students' learning by the use of portfolios for assessment?

3. Do you think that your students were motivated with the construction of on-line portfolios which can be viewed from their peers?

4. Give an example of something that you would consider the major problem you experienced for the use of portfolios for assessment?

5. Are you satisfied with the standard of your students' portfolio work?

6. What are your views on written tests used for the assessment in applied learning of multimedia?

7. Do you think that you are enthusiastic about the use of portfolios for assessment?

8. Do you think that portfolios were appropriate and effective tools for assessing competence? What are the supports you needed for your conduction of portfolio assessments?

9. What is the most important successful factor for the implementation of portfolio assessment?

10. What are your views on professional development? How can it help you to implement portfolio assessment?