AN INVESTIGATION OF E-PORTFOLIO IMPLEMENTATION IN THE MALAYSIAN SKILLS TRAINING PROGRAMME (MSTP)

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Declaration

This submission is my own work and contains no material previously published or written by Another person, nor material which has been accepted for the award of any other degree or diploma of the University or other institute of higher learning, except where due acknowledgement has been made in the text in the United Kingdom or overseas

Signature _____   Date_____

Acknowledgements

Abstract

The Malaysian Skills Training Programme (MSTP) is a sub-division of Malaysian Vocational and Training Education (VET) under the jurisdiction of the Ministry of Human Resource, Malaysia. The programme was developed to prepare skilled workers for employment in the 'blue collar' sector. The Malaysian Ministry of Higher Education and the UNESCO-UNEVOC believe that the VET should be upgraded to offer a more professional service in which ICT (Information and Communication Technology) applications such as electronic learning need to be explored and harnessed (Kafka & Dale, 2013).

This thesis investigates the implementation of an electronic portfolio (E-portfolio) in one accredited Skills Training Institution in Malaysia. The research aim was to deploy an E-portfolio which was developed using MAHARA software with several skills training courses in one training semester. The idea of a 'threshold concept' was adopted to provide guidelines to direct the E-portfolio development and implementation. Kolb's Experiential Learning (KEL) and Competency Based Training (CBT) were the main reference theories informing the design of the E-portfolio process of use. Based on quasi-experimental design, the system's implementation included groups of students in 2013 and 2014 cohorts. Upon completion, the use of the E-portfolio was evaluated to determine the system's impact and its effectiveness in the teaching and learning process. A mixed methods research approach was used, consisting of assessment rubrics, survey questionnaires, e-mail interviews, online communication and document reviews. A respondent's validation based approach called a 'report-and-respond enquiry' was executed at the end of data analysis to validate the findings.

Qualitative and quantitative data showed that the E-portfolio could contribute to the improvement of several aspects of teaching and training such as communication, reflection on practical work, motivation of learning, progress based learning, and the construction of new knowledge. In addition, senior staff believed that the use of an E-portfolio would benefit the institution by saving printing costs and enhancing the institution's image to the public and to the awarding body. The findings suggested that, when blended with the current traditional training pedagogy, the E-portfolio system has the potential to be implemented as a showcase E-portfolio, used for online assessment or can be used as a teaching approach. The email interviews and Facebook communication revealed that user attitudes and the support required for the use of the E-portfolio are the biggest challenges. Based on these findings, a scaffolded approach to the implementation of E-portfolios in MSTP is recommended. The key outcomes of this research are the E-portfolio scaffolding strategies in the MSTP that could be deployed at other Skills Training institutions or organizations which intend to explore the use of E-portfolios in the future.

Outputs and dissemination of research

The following presents the outputs the author has produced or contributed to during the course of the doctoral research

Publications;

Matsom, H., Duggan, P., Tracy, F., & Stott, T. (2015). E-portfolio Development and Implementation In Malaysian Technical and Vocational Education Training (TVET): A Mixed Methods Analysis Of Stakeholders' and Students' Perceptions. *International Journal of Arts & Sciences, 08*(01), 243-261.

Matsom, H., Stott, T., & Tracy, F. (2013). The Development of an e-Portfolio for Competency based Training Assessment for a Malaysia Skills Diploma Program. In *Proceedings of the 5th International Conference on Computer Supported Education* (pp.386-392). SciTePress – Science and Technology Publications.

Participation in academic events and external dissemination;

1. Oral presentation at the 5th International Conference on Computer Supported Education, Aachen, Germany – 6-8th May 2013

2. Oral presentation at the International Journal of Arts & Sciences Conference 2014, American University of Rome, Rome, Italy – 28-31st October 2014

3. Doctoral conference poster presentation, Faculty Conference, Adelphi Hotel, Liverpool – 24th June 2015

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List of Abbreviations, Acronyms and Symbols

CBT	Competency Based Training
CD-ROM	Compact Disc-Read Only Memory
CS	Computer System
CV	Curriculum Vitae
DKM	Diploma Kemahiran Malaysia / Malaysian Skills Diploma
DLKM	Diploma Lanjutan Kemahiran Malaysia / Malaysian Skills Advanced Diploma
DSD	Department of Skills Development
DVD	Digital Video Disc
ELC	Electrician / Electrical Wireman
E-learning	Electronic Learning
E-mail	Electronic Mail
E-portfolio	Electronic Portfolio
FB	Facebook
FES	Dressmaker (Fashion Designer)
ICT	Information, Communication & Technology
IT	Information Technology
JISC	Joint Information System Committee
KEL	Kolb's Experiential Learning
KP	Kitchen Practice
LDG	Plantation
LMS	Learning Management System
MOE	Ministry of Education
MOHE	Ministry of Higher Education
MOSEP	More Self Esteem with E-portfolio
MOSQ	Malaysian Occupational Skill Qualification
MQA	Malaysian Qualification Agency
MQF	Malaysian Qualification Framework
MSTP	Malaysian Skills Training Programme
MVTE	Malaysian Vocational and Training Education
NOSS	National Occupational Skills Standard
NVTC	National Vocational Training Council
SKM	Sijil Kemahiran Malaysia / Malaysian Skills Certification
SPSS	Statistical Package For Social Science
TVET	Technical, Vocational Education and Training
VET	Vocational Education Training
VLE	Virtual Learning Environment

CHAPTER 1

INTRODUCTION TO THE RESEARCH

1.1   Introduction

The use of E-learning is becoming an important and significant issue in current learning and teaching methodology. E-learning comprises a wide set of applications and processes which use available electronic media to deliver education and training. The term covers computer-based learning, web-based learning, and the use of mobile technologies; it includes virtual classrooms and digital collaboration (John, Kay, & Lynch, 2003). In Malaysia, a few types of E-learning have been introduced such as the learning management system by the Open University Malaysia to encourage student participation in learning. However, issues like students' awareness, lack of computer and bandwidth facilities, content quality and language barriers have constricted the usage of E-learning (A. Ali, 2009). Another recognised gap in E-learning technology is complexity (Nor, Raja, & Jhee, 2012), as E-learning has been perceived as complex, which led to misconceptions by early learners.

On the other hand, the E-portfolio is a subset of the E-learning technology that simplifies some functions in E-learning (Barret, 2010). Generally, E-portfolios may focus on students' participation in compiling and collecting learning evidence or artefacts as indicators of their achievement. This technology is one of the blended learning methodologies that combine traditional learning with electronic engagement. Previous research has shown that E-portfolio use could contribute to the enhancement

of teaching and learning in terms of reflection, communication, and social relationships as well as improving Information Technology (IT) operating skills and creativity skills (Barrett, 2005; Felce, 2011; Nor et al., 2012; Peacock, Gordon, Murray, Morss, & Dunlop, 2010; Yusof, Hashim, Hamdan, & Muhamad, 2013). The University of Technology Malaysia is the one and only Higher Education Institution in Malaysia that employs this system for their under-graduate and post-graduate students, although some of the higher institutions utilise the application in certain subjects or courses (Nor et al., 2012; Ruhizan, Norazah, Rahim, Faizal Amin Nur, & Jamil, 2014; Yusof et al., 2013).

The Malaysian Skills Training Programme (MSTP), also called the Malaysian Skills Training Certification, is one of the certification programmes under Vocational and Education Training (VET). The MSTP is controlled and administered by the Department of Skills Development (DSD), Ministry of Human Resources. In this education sector, until 2012 no institution or industry had yet introduced any E-learning application for their trainees (Dollah et al., 2012). This is because, in VET, the learning approach is different from that of the common higher education system, and the additional features like work-based training, competency-based-training, employability skills and other technical aspects that need to be embedded into the system make it difficult to develop. Ultimately, most VET institutions have chosen to run a traditional system instead of adopting technology training. However, recent research conducted by researchers from Universitiy Tun Hussein Onn Malaysia has shown an initial development towards the implementation of an E-portfolio in the MSTP (Mohd Bekri, Ruhizan, Norazah, Faizal Amin Nur, & Tajul Ashikin, 2013; Rahim, 2015; Ruhizan et al., 2014). The research, which was conducted from 2013 until 2015, reported some findings related to users' perceptions, users' readiness and key indicators for the use of the E-portfolio in the MSTP. Some of the findings recommended that several improvements should be made in order to ensure that the E-portfolio benefitted the MSTP such as restructuring the curricula, modification of teaching pedagogy and equipping the trainers with basic IT skills (Ruhizan et al., 2014). In addition, it recommended that the E-portfolio itself should be prepared and developed to meet the requirement of the MSTP learning environment, thus the indicator of an acceptable E-portfolio for MSTP was produced (Rahim, 2015). This study indicated that the E-

portfolio has a bright potential to be introduced to the students and instructors in the MSTP environment.

1.2   Research Background

The Malaysian government has initiated diverse strategies for becoming a high-income and developed country by 2020. One of the keystones of this goal is the provision and preparation of highly skilled human capital, the lack of which has stalled the nation's effort to move from the middle income trap into being a high-income economy. In this context, Technical and Vocational Education and Training (TVET) plays a pivotal role in providing the skilled workforce required for the country's economic transformation (Leong, 2011).

As the world has been utilising Information Technology (IT) for most of the business in all areas, TVET in Malaysia should take similar steps in order to produce highly skilled workers who are IT-savvy. Malaysia has developed its number of Internet establishments, so this is an opportunity to provide the training institutions with Internet facilities. TVET should revitalise the training pedagogy to include online and electronic learning in the curricula. The Malaysia Ministry of Higher Education in its report on The National Higher Education Strategic Plan Beyond 2020 stated that:

> *"One of the five strategic thrusts outlined in the 10 Malaysia Plan is to develop a world-class human capital by focusing on the 12 National Major Economic Areas (NKEAs), especially in the field of information and communication technology (ICT)and education services. " (Malaysia Ministry of Higher Education, 2013, p96)*

Improvements in science and technology offer new possibilities for vocational education. Furthermore, pedagogical developments lead researchers to find new approaches in the relationships among student, teacher, content, environment, and technology. Vocational educators are concerned with preparing students for the expectations of the workplace. For this reason, a product of some kind is expected from learners in the learning process in vocational education. Both production processes (learning) and products have the same important sense in the learning process (Turhan & Demirli, 2010).

In the current Malaysia TVET sector, training and learning has been implemented in a traditional way. The trainer acts as a teacher while the trainee is a student. This can leads to the production of spoon-fed graduates who lack self-regulating and self-determining skills (Zulkefli, Yusoh, & Ibrahim, 2012). For Level 1 and 2 students (Lower Level Skills Certificate), this is not an issue as the competency keys are not too high, but for Level 3, 4 and 5 students (High Certificate/Diploma /Advanced Diploma Skills), the ability to adopt current technology is important. This is because the prospective graduates from these levels must meet the requirements of the competency keys such as performing managerial tasks, using information technology, critical thinking and analysing as well as the ability to process corporate demands. The job titles of those programmes are "Supervisors (Level 3), "Assistant Manager/Executive (Level 4)" and "Manager/Executive (Level 5)", which correspond to the duties and responsibilities.

In addition, the trainees, especially students from Level 3 and above, must possess skills equivalent to the qualifications obtained. An example of a statement mentioned in the terms and regulations of MSTP accreditation stipulates that Level 4 Diploma graduates must have characteristics such as:

> "*Candidates are required to be competent in performing a broad range of complex technical or professional work activities that are performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. In addition, the responsibility for the work of others and allocation of resources is very often present. Other skills such as Information technology, supervisory and management skills should be developed as preparation to graduates as Diploma Skills Training*" (DSD, 2012, p18)

According to the 2011 annual report from one of the accredited training institutions in Malaysia located in the state of Pahang, 64% of the skills training students were ranked as moderate, while 15% were unskilled. Only 21% were proficient whilst 0% were highly skilled. This indicates that the levels of computer literacy for skills training students are still at a nascent stage (Jamil & Mat Som, 2011)

Apart from the demands of the national requirements and to fulfil the need to keep abreast of the current technology, this research was also prompted and motivated by my professional interest in the pedagogy of skills training programmes and the feeling

that this experience engendered; in particular, the sense of sensitivity and apprehension that is commonly encountered when reviewing the poor progress of competencies by skills training apprentices (Jamil & Mat Som, 2011). The same report found that more than half of the skills training students do not submit assignments on time and do not show course work progress to the instructor though requested to do so (Jamil & Mat Som, 2011). In fact, the results of a personal interview with one instructor during a study found that students were not communicating with the instructor, which meant that some information was not reaching them (Zulkefli et al., 2012). Problems such as students misinterpreting questions, or not reflecting on the questions, and their final results not achieving the required level of competence meant that the instructor had to re-assess them. On the other hand, the report also stated that the students had commented on the instructor evaluation form that only 63% of instructors allowed time for consultation outside class hours because of the constraints related to management tasks. Therefore, private time/space for instructor-student communication was found to be limited (Zulkefli et al., 2012)

Presently, there is no existing E-portfolio or other Virtual Learning Environment being employed by any institutions that run the MSTP. It has been confirmed by comments from the Director of Malaysian Occupational Skill Qualification (MOSQ), Department of Skills Development (DSD) that until 2012, there was currently no established framework regarding an online system or application in the Malaysian Skills Certification Programme. These comments were obtained during the preliminary study of this research via e-mail interviews. The e-mail interviews with other relevant officers from DSD also found that Malaysia's skills development currently needs to move forward in line with the global standards. DSD itself is in the process of developing, reviewing and refining a framework to introduce E-learning into the Malaysian Skills Certification Programme. The need to upgrade the current training process is becoming a priority (Mohd Nor, 2012).

Therefore, as a researcher that has a knowledge and skills background in Information Technology and Communication, I chose to implement this E-portfolio system with primary objectives which were to keep track of the students' progress and to improve their interpersonal skills such as communication, IT skills, teamwork and learning responsibility. I developed the system using MAHARA open source software and the

server that hosted this software and database was located in a Malaysian server farm. I rented the storage for 3 years and obtained 250GB of spaces for this purpose. I disseminated the web link address to the participants when the system and database was working successfully. Technically, I configured this system and the database myself. It was quite a challenge for me to set up this project from start to end. However, with assistance from various people including my husband, I managed to configure and publish the system successfully. Then, I developed the activities involved in the use of the E-portfolio by referring to the existing pedagogy of the MSTP. I discussed with the trainer about how the E-portfolio would suit the purpose of keeping track of the students' work and at the same time could develop their knowledge about electronic learning and application. The activities adopted the characteristics of the KEL and CBT approach where important features like learning by experiencing, learning by chunks and teamwork tasks were assimilated. The consent was obtained to implement this system in one state-owned skills institution starting in mid 2012.

1.3   Research Objectives

By associating the issues in the MSTP and the benefits of the E-portfolios that have been discovered through the literature review, this study expects to implement this system to improve students' learning and interpersonal skills like communication, motivation, reflection, knowledge construction and learning responsibility. E-portfolios might also play a role in being able to gather better perception from the public, especially parents and prospective trainees/students, in terms of technology adopted and as a 'buy-in' component of the skills training programme. Moreover, institutions that employ E-portfolios for their students will increase their image as a technology enhanced institution to the employer and career provider. Other than that, online E-portfolios could also supplement training curricula, especially for those who are not on the computer courses, such as students on plantation, electrical, beauty, fashion design and culinary courses.

Hence, this research aims to introduce a new learning environment in the MSTP which combines the E-portfolio elements with traditional teaching methods. Thus, the research focus is to develop and employ an E-portfolio system that will feature functions like 'Pages' to store artefacts and be part of the assessment submission place.

Other than that, the checklist, forum and messaging system also were embedded in the system so it can be used as a monitoring tool for students on the MSTP as well as to support reflection, the construction of new knowledge and skills, and improve communication. This E-portfolio practice could be a tool for the trainer to ensure that each of the apprentices is always on the right track. These students have to keep updating the checklist by verifying the competencies as determined by the National Occupational Skills Standard, because they are expected to graduate as professionals and to have the skills not only in their respective field but also other value-added skills.

For further details on the research aim and objectives of this study, please refer to Chapter Two.

1.4 A Brief Background of the study – E-portfolio deployment for Skills Training Education: Context and Concept

Electronic portfolios have been found to be a valid way by which to document student progress, encourage student involvement in assessment, showcase student work samples, promote students professionally, and provide a method of student learning outcomes and curriculum evaluation (Buzzetto-more & Alade, 2008). An E-portfolio is a product created mainly by the student which contains a collection of digital objects (artefacts), combining various media like audio, video, text and images (Abrami & Barrett, 2005) articulating experiences, developments, achievements and learning. For the student, the aim is to collect evidence for summative assessment, to demonstrate achievement, to record progress and to set targets (Freitas & Mayes, 2004); while other participants could also be involved in the use of E-portfolios, such as teachers, skilled workers or anybody who wants to record their achievement or even a piece of work for different purposes like professional development, collection of personal achievement and others (Klein, 2012). E-portfolios are widely accepted in higher education in developed countries as well as in further and vocational education (Kocoglu, 2008; Turhan & Demirli, 2010).

Despite the previous studies which demonstrate the advantages of E-portfolio such as enhancing students' motivation (Coolin & Harley, 2010), improving communication and feedback (Kicken, et.al., 2009; Krämer & Seeber, 2009), and organising students'

evaluation and assessment, as mentioned above, there are also drawbacks that need to be considered before implementing the system. In contrast to Gerbic et.al.'s (2009) initial reports where the students' main challenges in E-portfolio usage is the ability to deploy the technology, Nor, Raja, and Jhee's (2012) evaluation of E-portfolio deployment found that students and lecturers did not face many challenges in the technological aspect, but they did face many challenges in the construction of knowledge and making meaning out of the process in which they engaged. On the other hand, the lecturers had to contend with many issues in moderating the E-portfolio. So they suggested further research on simplifying the E-portfolio process to increase understanding and engagement of users' participation. This is supported by earlier research by Brown (2009), where he found the perception of users relating to the E-portfolio development process was that it had compounded their academic workload as well as proving to be challenging and time consuming, especially with regard to how to transform a paper portfolio into an e-format. Therefore, the systematic and strategic process of E-portfolio application should be designed by considering issues such as the technology used, the process activities and the support process to assist the understanding of the application and knowledge dissemination.

In the context of Skills Training pedagogy, the E-portfolio process supposedly encourages the learner to review and reflect on what they have done, made, experienced or learned (Atwell, Agnieszka, Pallister, & Hornung-Prahauser, 2007). They are encouraged to record their reflections in their E-portfolio and share them with others. This gives value to reflection and requires reflection to be explicit and more visible. This in turn might result in the learner deriving more benefit from the reflection stage, previously something of an invisible process. The E-portfolio process informs and supports the planning process. The learner uses their reflections to plan what it is that they must do to move forward, to learn something, to achieve something, to produce something, etc. It simply adds the Record stage to the Plan, Do, Review cycle as illustrated in Figure 1.1. The Record stage is very important in that it can make the reflection more 'explicit', which in turn enables and encourages the learner to share their reflections with others. The sharing process might help the learner to take more from the learning experience, but, more importantly, if a learner has to spend time preparing their thinking so that they can share it with others they might engage in 'deeper' thinking as they try to make sense out of their experience and fit it into their

existing thinking, memories, structures, etc., hopefully enabling them to take more out of the learning experience (Atwell et al., 2007). The different stages of the learning process (derived from KEL's learning cycle) can be combined with the E-portfolio processes. When doing so, a new conceptual model of learning with E-portfolios can be drawn as Figure 1.1.
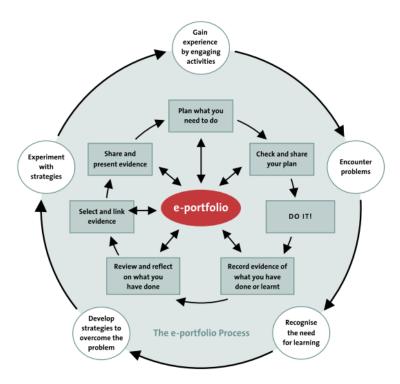
Figure 1.1 The E-portfolio Process in The Learning Loop (source: Atwell et al., 2007, p31)

Moreover, Atwell et al. (2007) also stated in their report on the MOSEP Project that E-portfolio use is expected to provide benefits such as improving learning, supporting lifelong-learning, ability to record learners' progress in performance and achievement and yet facilitate the informal learning environment, and competence development.

This research has adopted the 'Thresholds concepts' that has been introduced by Joyes, Gray, & Hartnell-young (2010) to develop the objectives and outline the important aspects of the E-portfolio development and implementation. By using this guideline, the essential features that need to be taken into account are planned, reviewed and deployed. Chapter 3 specifically explains about the 'Threshold Techniques' which have been implemented in this research. In addition, in this research, the focus of E-portfolio

development was emphasised in the process of use, which has adapted the Kolbs's Experiential Learning (KEL) theory and Competency Based Training (CBT) approach that suit the nature of Vocational and Skills Training Education. The focus of the research has also been pre-determined to be the assessment platform combined with the traditional methods. Students need to use the E-portfolio to submit their work progress until they complete the task assigned by submitting the final reports. The instructions of the 'E-portfolio based assessment' have been designed and elaborated in the process by considering essential details derived from those theories. At the end of the deployment, the participants, who are students and instructors, had to evaluate the execution to discover how far this system can impact the learning process in the MSTP. Further information regarding the E-portfolio development is provided in Chapter Three.

1.5   Research Methodology and Data Analysis

This research employed mixed methods, as it takes a pragmatist view of the problem statement, where the researcher is allowed to choose a suitable method depending on the consequences of previous outcomes and the research aims (Creswell & Clark, 2011). This research employed a quasi-experimental design as part of the approach to implement the E-portfolio to the MSTP. In these experiment, students from few courses were evaluated prior and post implementation of the system. The pre and post scores of th assessment rubric were compared to see the differences and similarity.

Thus, both quantitative and qualitative data collection methods were employed, such as evaluation of the rubric, survey questionnaires, e-mail interviews and, finally, Facebook communication and posting. Chapter 4 discusses the research methodology in more depth. Consequently, the results gathered from those methods were then analysed using various techniques, depending on the independent objectives targeted. Techniques including percentage calculation, non-parametric tests and the 'Framework' approach based on thematic analysis were executed to produce meaningful findings. The process of analysing the data is further explained in Chapter Five. Finally , through triangulation, the findings were amalgamated to produce the

final conclusions, where the important process of producing the research findings and innovation are discussed in Chapter 6.

1.6 Structure of the thesis

This thesis comprises seven chapters describing the relevant research investigation processes starting from planning, literature reviews, research methodology applied, data collection and analysis, presentation of findings, and finishing with recommendations for future research.

Chapter One: Introduction

This chapter has briefly explained the background of the study, the problem statement that motivates the research investigation, the research objectives, the background to E-portfolios in the context of the MSTP and the research methods undertaken in order to accomplish the research aims.

Chapter Two: Literature Review

The second chapter of the thesis reviews relevant literature, which includes multidisciplinary studies in the fields of education and Information Technology (IT). The review begins with the background of the MSTP, its features, structures and current issues. Then, the E-learning literature provides the information on past studies involving online learning and E-learning in the Malaysian context as well as research conducted in other countries. The review continues with the literature on E-portfolio applications in the academic world. The benefits, limitations and issues are discussed and critically reviewed in order to produce a strong foundation to construct a rationale to embark on this research project. Then, a description of the rationale for E-portfolio development in the MSTP is briefly presented. Finally, the review of MAHARA software, which is the software chosen to be the platform for the E-portfolio project, is discussed followed by the research aims and chapter summary.

Chapter Three: E-portfolio Development in the MSTP: Concepts, Context and Theories

In this chapter, a brief description of the structures of the E-portfolio is given. The 'Thresholds Concepts' that have been adopted for the E-portfolio development process are elaborated and discussed further. The features of E-portfolio that need to be measured to discover its impact on the MSTP are also detailed. At the end of the chapter, the summary is presented.

Chapter Four: Research Methodology

This chapter discusses the research methodology employed in this study as well as the methods used to collect data in order to conduct the research. This chapter also describes the sampling strategy, the ethical considerations, the data analysis and the techniques to validate the results. The chapter ends with a brief summary to conclude the content for this chapter.

Chapter Five: Research Activities and Data Analysis

This research is a multi-phased project comprised of a preliminary study and actual implementation for the 2013 and 2014 cohorts. Therefore, this chapter presents the research activities and data collected from all of the research activities. There are four parts to this chapter. The first part discusses the activities and results of the pilot test that was conducted during the preliminary study. Next, the second part presents the activities involved in the actual implementation for the 2013 and 2014 cohorts. The third part explains the data gathered from the quantitative methods, which included the rubric of assessment and the survey questionnaires. The final part describes the data obtained from the qualitative methods, which were the email interviews and Facebook communication and postings. The chapter then concludes with a summary.

Chapter Six: Research Findings and Discussion

This chapter summarises the findings gathered in the previous chapter and presents the process of amalgamation of those findings to produce concise, holistic and inclusive end results. The proposed scaffolding techniques versus user types is also described after the validation of final results is presented. Then, the limitations of the study and the checklist of research evidence are detailed. The chapter ends with a summary.

Chapter Seven: Conclusion and Recommendations for Future Research

This chapter is the final chapter and is dedicated to summarising this study. It describes the research contribution, research originality, recommendations for future planning, future research and development, personal reflection throughout this study and, lastly, the final conclusion of this research.

Figure 1.2 in the next pages illustrates the thesis organization including chapters' title and important headings in this research.

1.7   Chapter Summary

This chapter has outlined the background to the research through a brief description of the MSTP, E-learning and E-portfolio use. The statement of problems has been addressed, which arose from issues in the MSTP and the opportunities offered by the E-portfolio. However, the details of research aims are not discussed here; they have been placed in Chapter Two, after the literature from all aspects related to this study has been reviewed and critiqued. Thus, this chapter has provided an overview of the study through a short background of the MSTP, the advantages of E-portfolio and the background of E-portfolio development in the MSTP which will be discussed further in the next chapters. The flow of this research is illustrated in Figure 1.2 The structure of the study.

A Mixed Method Study on E-portfolio Implementation in the Malaysian Skills Training Programme

Chapter One:
A brief introduction of research background

Chapter Two:
Literature Reviews, Research Aim and Objectives

Chapter Three:
E-portfolio in MSTP: Concept, Context and Theories

Chapter Four:
Research Methodologies

Mixed Methods:
Rubric of Assessment, Questionnaires, Interviews

Chapter Five:
Research Activities and Data Analysis (Quantitative & Qualitative)

Preliminary Study

2013 Cohort

2014 Cohort

Chapter Six:
Research Findings and Discussion

Validation of Findings,
Proposed Framework: Scaffolding Techniques

Chapter Seven:
Conclusion and Future Recommendations

Figure 1.2 The Structure Of the Study (Source: Self-study)

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

In order to provide a broad review of each topic, this chapter explains the possible factors that contribute directly or indirectly to the deployment and evaluation of the E-portfolio system in the Malaysian Skills Training Programme (MSTP). The research into E-portfolio deployment and evaluation in the MSTP has been influenced by several factors such as the background of the Technical, Vocational, Education and Training (TVET) system, the existing situation of online learning in VET, and the reviews of previous E-portfolio research in higher education and in the vocational sectors. Before ending the chapter, an overview on why the E-portfolio system should be introduced to the MSTP is provided. Thus, this chapter has four sections and a conclusion which summarises its content.

The first part discusses the background of Malaysian TVET and the CBT theory, which underpins this programme, while the second part presents the context of online learning in Malaysia TVET. The literature on E-portfolio is also discussed in this section as the E-portfolio is a subset of online learning technology. The potential benefits and challenges are explored to provide insight into this application. Then, in the third part, the theories of learning that underpin this study are discussed, as the E-portfolio process that has adopted one of those theories is one of the innovations in this study. Before ending the chapter, in the fourth part, the open source software MAHARA is elaborated upon to provide reasons why this software package has been chosen to be the platform for this project. Additionally, in this part, the research aims and objectives that have

been formulated based on the previous literature resources are explained. Finally, a conclusion that summarises the findings from the literature review is provided. The information in the literature has been very beneficial as a guide to develop this research in order to meet the objectives and goals to be achieved. The structure of the literature reviews has been mapped out as shown in the Figure 2.1 below.
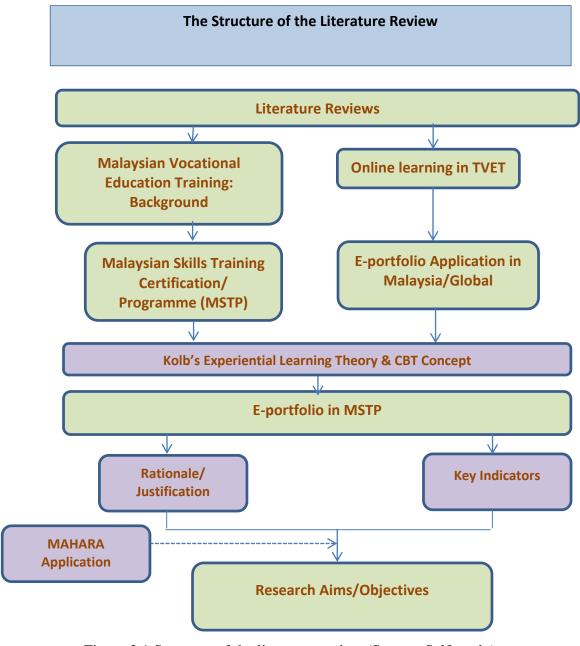
Figure 2.1 Structure of the literature review (Source: Self-study)

2.2   The Malaysian Education System

Education is a priority of the Federal Government of Malaysia, which is committed to providing quality education for all. Generally, the national education system is divided into pre-tertiary and tertiary education. There are two governing authorities for the education sector. Pre-tertiary education (i.e. from pre-school to secondary education and teacher education) is under the jurisdiction of the Ministry of Education (MOE), while tertiary or higher education is the responsibility of the Ministry of Higher Education (MOHE) (Yunos, W.Ahmad, Kaprawi, & Razally, 2011).

Public and private education providers in Malaysia play an equally important role in the provision of higher education (MOHE, 2013). Together, the public and private sectors provide abundant study options. Higher educational institutions offer programmes leading to the award of certificates and diplomas as well as postgraduate qualifications. The Malaysian Qualifications Agency (MQA) is an assurance that the public and private education sectors are working hand-in-hand to make Malaysia a centre for educational excellence in the region, providing quality education for all. Students in Malaysia can choose to study one of the following:

1) Locally-run programmes,
2) Twinning academic programmes,
3) Vocational or technical programmes, or
4) Technical and skills training programmes accredited by the Ministry of Human Resources

2.2.1   Malaysian Qualification Framework

In Malaysia, educational and training institutions encompass both public and private colleges, universities, vocational institutions, professional institutions and other higher educational institutions as well as training centres in the workplace offering courses and training based on a coordinated system of qualifications called the Malaysia Qualification Framework (MQF). This unified system was presented by the Quality Assurance Division to the National Higher Education Council in November 2002 and was approved in November 2003.

The MQF was designed to outline the single interconnected structure which fulfils the nationally endorsed criteria, positioning and interlinking all qualifications. This structure demands understanding of its foundation, which is principally expressed as competency standards or learning outcomes, the volume of academic load conveyed as credits in terms of total student effort to achieve the learning outcomes, the purpose and character of the qualification, and consistency of nomenclature. Based on these criteria, the MQF is composed of the Certificate (Vocational and Higher Education), Diploma and Advanced Diploma, Bachelor (Hons), Masters, PhD and earned doctorates and "conversion" awards named Graduate Certificate and Diploma and Postgraduate Certificate and Diploma (Yunos et al., 2011)

Table 2.1 shows the three principal elements of the MQF, which are qualifications, providers and the educational sectors in which the qualifications are awarded. By combining these three elements, the MQF encourages partnership between the public and private sector and among non-degree, undergraduate and postgraduate levels, as well as encouraging parity of esteem among academic, professional and vocational qualifications.

'Qualification Level' represents public certification awarded by an accredited provider to a participant who has successfully completed a specified set of learning or training outcomes with a particular purpose and at a particular level, which are correctly examined, assessed and quality assured. 'Providers' refers to either a public or private institution or other professional and licensing authority that runs the programmes and courses, maintains the learning quality, assesses and examines participants and, finally, awards appropriate certificates to successful qualified participants at the end of their course.

Three educational sectors are involved in awarding qualifications. The first sector is Academic & Professional, which provides theoretically challenging knowledge and requires intellectual depth and thoughtfulness in accomplishing tasks, and also skills and attitudes that enable a person to assume responsibilities with substantial autonomy in their professional discernment. The second sector is the skills sector, which is engaged in providing training in skills that are technical and industry related. The skills are gradually obtained through progressive stepwise training. Beginning from the level of semi-skilled, the training enables students to continuously develop, level by level,

right up to supervisory, executive and managerial functions. The method of learning is competency-based training, which is 30% theoretical and 70% practical based.

Table 2.1: Malaysian Qualification Framework (Leong, Spottl, & Jailani, 2009)

Provider	Workplace training, Continuing professional development (CPD), Lifelong learning (RPL)					
Provider	University	Post-Secondary Schools, Polytechnic and College			Licensing Authorities, Professional institutions	
Education Sector / Qualification Level	Academic & Professional		Technical, Vocational Education Training (TVET)			
Education Sector / Qualification Level	Academic & Professional		Skills	Technical, Vocational & Professional		
CERTIFICATE		Matriculation, STPM, STAM, Foundation or Pre-University Certificate	*SKM 1 *SKM 2 *SKM 3	Technician Certificate and other occupational certificates	Certification/ licensing for practice	
DIPLOMA		Matriculation, STPM, STAM, Foundation or Pre-University Certificate	#DKM	Diploma (Technical Vocational, Professional, etc.)	Certification/ licensing for practice	
DIPLOMA			#DLKM	Adv Diploma (technology, etc.)		
BACHELOR	Bachelor (Hons)				Certification/ licensing for practice	
BACHELOR	Graduate Certificate & Diploma				Certification/ licensing for practice	
MASTERS	Masters (research, coursework, professional, combination)				Certification/ licensing for practice	
MASTERS	Postgrad Cert & Diploma					
DOCTORAL	PhD				Certification/ licensing for practice	
DOCTORAL	Higher Doctorate e.g. DEd, DEng, DSc					

*SKM-Sijil Kemahiran Malaysia (Malaysian Skills Certificate)
#DKM, DLKM-Diploma/Diploma Lanjutan Kemahiran Malaysia (Diploma/Advanced Diploma in Skills)

The third and last sector is the vocational, technical and professional sector, which provides education and training encompassing a wider range of abilities and responsibilities with a vocation or occupation as the result. The education provided enables a person to practice or to be licensed in specific occupations or vocations such as registered insurance agent, health inspector, unit trust or stock market agent and others. Some qualifications might require the application of considerable personal autonomy or professional judgement. The second and third sectors are encompassed in the **Technical, Vocational Education and Training (TVET)** system where all the programmes will follow their own framework and processes..

2.2.2   Technical & Vocational Education Training (TVET) in Malaysia

Fundamentally, Malaysian Technical & Vocational Education and Training has progressively developed into three dissimilar streams, namely higher education, technical and vocational education, and skills training (Leong, Rajamorganan, & Sim, 2010).

Table 2.2 below explains the differences between these pathways in the anticipated working area and types of institution involved in each stream.

Table 2.2: Types of Technical & Vocational Education and Training in Malaysia (Source: Paraphrased and tabulated from Ahmad (2003, p.6)

Stream or Pathway	Type of Institution	Expected Labour force/Position
1. Higher Education	Universities and other higher learning Institutions (Public and Private)	Professional and managerial employee e.g. Assistant Manager, Finance Officer, Engineer and Project Manager
2. Vocational and Technical Education	Community College, Polytechnics, Technical Colleges, Professional College (Public and Private)	Posts with a supervisory function, like Supervisor and Technical Assistant
3. Vocational and Skills Training	Skill Training Institutions (Public and Private)	Semi-skilled and skilled workers

Blumenstein et al. (1999) explained in "The Basic Study on Designing a Dual Training Scheme in Malaysia" research from 1997 to 1999 with a large group of consultants from Germany, that the Malaysian system had increasingly adapted skills training based on the National Occupational Skills Standard (NOSS) as an essential component in TVET. They classed the system excluding tertiary and higher education into three subsystems:

i. **Technical Education and Vocational Training**, which is implemented in schools (technical and vocational secondary school) and controlled by the Ministry of Education (MOE). It was structured and integrated into the existing general

education system leading to the Malaysian Certificate of Education as the leaving qualification.

ii. **Technical and Vocational Training**, which is undertaken in public and private training institutions. This subsystem is not under the jurisdiction of the MOE but is organised and administered by other federal ministries such as the Ministry of Human Resources, Ministry of Youth and Sport, Ministry of Agriculture and Ministry of Entrepreneurial Development.

iii. **Skills-based certification**, which is based on the *National Occupational Skills Standard and Certification* system. It is also called the **Malaysian Skills Training Programme (MSTP)**. It began with a three-level skills certification system (Basic, Intermediate and Advanced) but, in 1992, a new five-level skills qualification framework was introduced. In 1993, the system changed to a developed accreditation approach encompassing a five-tiered skills certification system under the Malaysian Skills Qualification Framework and managed by the National Vocational Training Council (NVTC).

2.2.3 Skills-Based Certification/Malaysian Skills Training Programme (MSTP) – National Vocational Training Council (NVTC) and Malaysian Skills Qualifications Framework

On 2nd May 1989, the National Vocational Training Council (NVTC) was constituted under the Ministry of Human Resources, Malaysia, to execute, monitor, organise and manage vocational and skills training in Malaysia (DSD, 2012a). The NVTC is a national body entrusted with a big role in designing, supervising and coordinating industrial and vocational training schemes and programmes, including executing and enforcing a national skills certification programme for the country. The NVTC plays an important role in resolving skills training functions, missions and achievement, and has been through a few adjustments and review processes related to the policy and overall skills training system. This revamp was conducted in search of a more effective framework for vocational training in the country, upon sensing the absence of a clear pathway for the qualification and career advancement of skilled workers. In 1993, the NVTC introduced two major changes in it's policy: the adoption of a new five-level National Skills Qualification Framework (Levels 1-3 for Skill certificates and Levels

4-5 for Diploma/Advanced Diploma in Skill) in transformation of the previous three-tiered skills certification system to address the deficit of vocational & skills training in Malaysia, and the setting up of a new accreditation approach in replacement of the prevailing trade testing system.

These policy reforms were basically geared towards enhancing the quality as well as productivity of the country's skilled workforce, hence contributing to improve the competitive position of the Malaysian economy at large (Leong, 2008). The modifications were also brought in to attempt a more effective coordination of the varied and diverse vocational training activities that are conducted by both public and private sectors in Malaysia, and to steer them towards achieving the real needs of Malaysian industry (Leong, 2011). The two fundamental thrusts of these reforms can be detailed as follows:

i. **Competency-based learning/training (CBL/CBT)** principles need to be adopted in vocational training in Malaysia. This is a learning method that swaps the 'Instructor-centred' approach with the 'trainee-centred' approach, entailing the identification of diverse and verifiable competencies that are actually required in the working world, as well as focusing on actual performances in the assessment of these competencies

ii. To make the National Skills Certification System in Malaysia **more flexible, accessible and user friendly.**

2.2.3.1 Competency-based training

Competency-based learning/training (CBL/T) is a current method used to bring together the gap between learning in educational settings and future workplace performance, which represents a challenge for institutions of higher and further education (Sluijsmans, Prins, & Martens, 2006). In competency-based learning methods, the models and learning strategies used must be able to encourage reflection and reactions from students in an effort to solve the problems and challenges they face during training. The students are often tested with problems that require skills and knowledge based on previous experience or what they have learned. Competence is important so that students will master the skills needed in 'real world' industry

(Bastiaens, 2010). Technically, in CBT students need to collect proof of their skills during training so that their competence can be recognised. CBT is based on specific objectives and can be measured directly in alignment with teaching activities. Students need to succeed in the final performance evaluation to determine whether they have mastered the attitudes, skills, and knowledge set for the course. Instructors or supervisors should review the data, make appropriate programme modifications, and offer additional instruction and guidance to trainees who do not master the training. McCowan (1998) has developed a comprehensive model that contains detailed specifications of the procedures involved in developing CBT programmes. Based on this theoretical orientation, CBT must have the following characteristics:

i. Clear job descriptions and programme outcomes, including needs assessments based on job-related competencies, structured hierarchy of domains, competencies and objectives.

ii. Instruction based on specific behavioural objectives with opportunities to apply new attitudes, skills, and knowledge.

iii. Post-test assessment of trainee performance compared with clear criteria.

iv. Remedial training and On the-Job-Training (OJT) mentoring to assure trainee mastery of essential material.

In Malaysia, the MSTP was developed in alignment with this CBT approach. These programmes were organised and coordinated by the National Vocational Training Council under the jurisdiction of the Ministry of Human Resources. To implement CBT, a National Occupational Skills Standard (NOSS) was developed (Leong et al., 2009). The development of the NOSS in Malaysia has basically revolved around the classification of apparent and verifiable competencies known as duties and tasks in the job profile, for identified job titles. For every NOSS-based training programme, the learning outcomes to be achieved are stipulated in the task profiles of the NOSS, which include performance standards to be achieved at the end of the training programme (Sachs, 1998). The training objectives, or outcomes, are specified and shown to trainees in advance so that trainees can progress at their own optimal rate. In other words, the duration of time spent on training can be a variable but the learning outcomes to be achieved are considered to be constant (NVTC, 2001, p.8). The focus

on outcomes is clearly reflected in the interpretation of the 'competency' concept that underpins the training system based on NOSS in Malaysia:

"The concept of competency focuses on what is expected of a worker in the workplace rather than on the learning process. It embodies the ability to transfer and apply skills and knowledge to new situations and environments" (MLVK, 1995, p.1).

2.2.3.2 Malaysian Skills Qualification Framework

The National Skills Qualification Framework, also known as the SKM Qualification Framework, was introduced in 1993. This framework is operated based on the National Occupational Skills Standard (NOSS), where each trainee would be assessed and verified based on whether they have completely fulfilled the requirements of NOSS before being approved and awarded with the SKM/DKM (Sijil/Diploma Kemahiran Malaysia/ Malaysian Skill/Diploma Certificate) qualification under the Malaysian Skills Training Programme (MSTP). This approach would basically help to provide a larger labour force comprising the skills and expertise to compete in developing local industry as well as the world market.

Furthermore, the SKM framework is also exposing candidates to another qualification path and career development opportunity that has been established in line with the academic qualification structure. Thus, candidates could project and forecast their target path and determine which field will suit them in the coming years.

The development of this new skills qualification structure has opened up opportunities for a large percentage of school leavers, or those who do not have the interest or intention to further their studies at academic institutions. Moreover, it also provides an opportunity for existing workers who have no qualifications to obtain them by showing their evidence of their working experiences. The National Skills Qualification framework encompasses five-levels of skills certification, as shown in Table 2.3 below.

Table 2.3: Five-level skills qualification and competencies achieved/expected (DSD, 2007a)

Qualification awarded	Competencies Achieved or Expected
SKM Level 1	- Competent in performing a range of various job/tasks/works/activities, most of which are routine and predictable
SKM Level 2	- Competent in performing a significant range of varied work activities that are being performed in a variety of contexts - Some of these activities are non-routine, requiring individual responsibility and autonomy
SKM Level 3	- Requires competency in performing a broad range of varied work activities that are performed in a variety of contexts, most of which are complex and non-routine. - There is also a considerable amount of responsibility and autonomy, while control and guidance are also often required.
DKM Level 4	- Candidates are required to be competent in performing a broad range of complex technical or professional work activities that are performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. - In addition, the responsibility for the work of others and allocation of resources is very often present.
DLKM Level 5	- Trainees would need to possess the necessary competence in order to be able to apply a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. - The prominent features of this level include: • Very substantial personal autonomy • Significant responsibility for the work of others and for the allocation of substantial resources, and • Personal accountability for analysis and diagnosis, design, planning, execution and evaluation.

SKM-Sijil Kemahiran Malaysia (Malaysian Skills Certificate)
DKM, DLKM-Diploma/Diploma Lanjutan Kemahiran Malaysia (Diploma/Advanced Diploma in Skills)

Table 2.3 shows the five levels of the SKM qualification that are included in the National Skills Qualification Framework. Participants at each level must meet the required key competencies in order to qualify for the skills certification. These competencies are assessed and evaluated based on participants' work evidence such as products and services, and their attitude and behaviour are also taken into consideration.

The evidence needs to conform to **NOSS** requirements and fulfil all determined standards.

2.2.3.3 National Occupational Skills Standard (NOSS)

The National Occupational Skills Standard (NOSS) was first introduced in 1992, and was developed by the NVTC as the basis for the accreditation standard of the national skills certification system in Malaysia (Leong, 2008). Later, NOSS became the legislative framework of the MSTP in the country with the enactment of the National Skills Development Act in 2006. In "Guidelines for the implementation of Malaysian Skill Certification through the accreditation system" (4th Edition, 2005) NOSS is defined as:

"a specification of the competencies expected of a skilled worker who
is gainfully employed in Malaysia for a particular occupational area or
level"(MLVK, 2005,p.2)

NOSS is considered to be a useful tool in increasing workers' quality of work. It is composed and formed by expert workers and practitioners who are legally appointed by the NVTC, where they would be responsible for identifying and listing the competencies required in the respective job field. NOSS plays an important role for skills training institutions as it is used as a basis for developing course content, preparing learning facilities and as a guideline for assessment. Moreover, it is also being used in many contexts in the working world, such as identifying training needs, staff performance appraisal, benchmarking workers' performance and other significant functions (DSD, 2012a; Leong et al., 2009).

The areas of competencies covered under NOSS are still limited by only being relevant to selected industries. However, the NVTC is making continuous efforts to ensure that all current industries will have their own NOSS. Table 2.4 below shows the skills sectors covered under the MSTP, organised in alphabetical order, for which SKM qualifications (SKM Level 1-5) are being awarded.

Table 2.4: List of the skills and competencies covered under MSTP (Ahmad, 2015)

-Aviation	-Mechanical-Mechatronic
-Building & Construction	-Mechanical-Production
-Business & Finances	-Metal Machining Technology
-Business & Finances – Insurance	-Motor Vehicle Assembly
-Draughtsman	-Motorcycle Assembly
-Electric	-Non-destructive Testing
-Electronic, Audio & Video	-Office Management
-Handicraft	-Oil & Gas
-Hotel	-Personal Services
-Information and Communication Technology-Security	-Plastic Industry
-Information Technology-Computer	-Precision Instruments
-Information Technology-Multimedia	-Printing Technology
-Information Technology-Telecommunication	-SCUBA Diving-Recreation
-Agriculture-Livestock	-Diving-Commercial
-Agriculture-Fishery	-Steel Making & Foundry
-Agriculture-Plantation & Oil Palm Mill	-Surveying –Land
-Agriculture-Food Processing & Related activities	-Textile & Apparel
-Machinery & land Transportation	-Tourism & Travel
-Machinery & land Transportation-Crane	-Tourism & Travel –Theme Park
-Maritime	-Weapon technology
-Mechanical-maintenance	-Welding Technology & Metal Fabrication

The outcome-based orientation of the competency-based approach is usually characterised by its strong emphasis on assessment. This can be seen from an interpretation of the assessment which is typically used in competency-based training, as the process of accumulating evidence and making judgments on the extent and nature of progress towards the performance requirements set out in a standard, or a learning outcome (Hager, Athanasou, & Gonczi, 1994). By adopting the competency-based approach, the training system based on NOSS in Malaysia clearly favours an outcome-based orientation. This orientation has been accentuated by the implementation of a national skills certification system which adopts a criterion-referenced assessment approach, focusing on performances as the key basis for assessment and certification (NVTC, 2001).

Figure 2.2 shows the process of evaluation in the MSTP. Each student must meet the criteria of competence in modular training programmes as well as in the complementary programmes. They also need to accomplish the final project and six months of industrial training before they are qualified to be awarded the Diploma

certificate. All assignments, documents and evidence of competencies of both knowledge and performance assessment for NCS Core Abilities and modular tasks are compiled in a large file called the student portfolio.
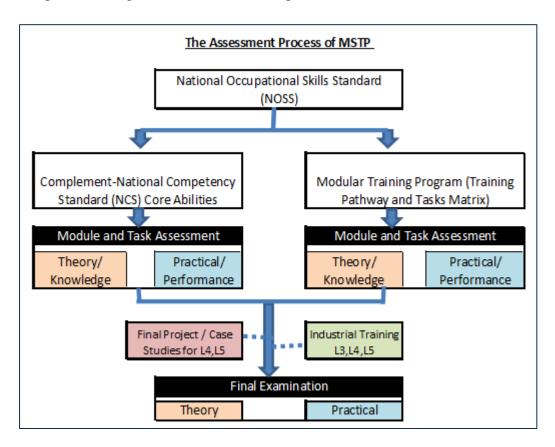
Figure 2.2 : Existing CBT Assessment Process in the MSTP (adapted from DSD (2007))

Today, all MSTP curricula are based on NOSS and are offered by a wide range of public and private training institutions. However, before an institution is allowed to run the MSTP, the centre must obtain an accreditation status from the NVTC. According to DSD (2007b), accreditation is a procedure by which the NVTC would approve a particular organisation as an Accredited Centre, in order to enable the organisation to implement training and assessment in specific skills programmes at different skill levels that finally lead to the award of Malaysian Skill Certificates/Diploma/Advanced Diploma (SKM/DKM/DLKM).

The accreditation represents a mandate given by the NVTC to the Accredited Centre to offer, manage, administer and maintain the quality of the Malaysian Skills Certificates for specific jobs that are covered by the NOSS. Upon the accomplishment of

accreditation, the respective Accredited Centre can offer training courses to all interested participants and conduct assessment and evaluation for SKM certification purposes. The NVTC has put the responsibility onto the MOSQ (Malaysian Occupational Skills Qualification) division to ensure all Accredited Centres conform to the predetermined rules and regulations so skills training objectives could be achieved accordingly.

As of May 2015, a total of 1002 training institutions have been accredited to offer different fields of skill programmes based on NOSS, of which 348 centres are managed by public agencies and authorities whilst the remaining 654 are comprised of privately-run institutions, the industry training organisation and the associations' training organisations (Ahmad, 2015).

2.2.3.4 Issues and challenges in the Malaysian Skills Training Programme (MSTP)

To achieve the 10th Malaysian Plan that was outlined in late 2012, the Department of Skills Training (DSD) identified the main agenda to be attained, which is to mainstream and broaden access to high-quality Technical, Education, Vocational and Training (TVET) in order to increase the skills-based workforce in the nation (I. Ahmad, 2015; MOE, 2012). The primary action through which to accomplish this mission is to raise the skills of trainees so that their employment opportunities will be improved. Based on the issues and opportunities occurring in current MSTP trends, there are four matters that need to be addressed due to their impact on the quality of the MSTP in current and future implementation.

The first issue that arises in the MSTP is the public perception of the MSTP and TVET as one of the education options in the country. The Director of the Department of Skills Development (DSD), Ministry of Human Resources, Dr Pang Chau Leong, stressed in his paper-"Key Reforms in Revitalising Technical and Vocational Education and Training (TVET) in Malaysia", presented in 2011 at the regional conference on Human Resouce Development, stated that skills training in Malaysia has experienced issues such as poor perception and recognition of TVET due to societal stigma created by the

impression that this programme is focusing on school drops-outs, and provides a second-class education with fewer opportunities for career success. The public sees that this programme is designed for those who have not been accepted for higher academic institutions, and feel that they have no choice but are 'forced to' enrol their children on this programme as an alternative line of education. A nationwide promotional campaign to disseminate the information about this programme needs to be conducted so that the prospective trainees will comprehend the direction and advanced path it offers upon graduation. Other issues like poor monitoring and evaluation of trainees also arose when certain training institutes had not improved their curriculum and facilities to bring them on a par with the standard that had been set (Leong, 2011). Therefore, the second challenge is to upgrade and harmonise the MSTP curriculum in all accredited centres so the quality of the training and its competencies will be maintained by following the standards that have been established. The quality of the curriculum also needs to be revised so it will be upgraded in line with the industry requirements and may reach a similar level to those in the established international TVET institutions.

In addition, the delivery of the curriculum also needs to be streamlined so that maximum comprehension of the module contents can be achieved. Various delivery methods that have been adopted at the international vocational institutions must be studied and tested. The delivery system plays an important role in attracting students and may improve reflection (Puteh & Hussin, 2007), thus enhancing the quality of graduate trainees prior to entering the employment sector. Finally, increasing the skills-based workforce by improving their off-the-job and on-the-job training skills can be achieved by developing highly effective instructors and trainers in the accredited institutions or organisations. These trainers need to possess multiple skills, not only in their particular major field, but also additional skills such as computing, administration, public relations and other soft skills are needed. This programme requires experienced trainers who can teach students more about practical work rather than lecturing in a classroom, as the MSTP training structure is 60-80% hands-on learning and 20-40% theoretical in-class sessions (DSD, 2007b). Thus, the professionalism of the instructors is vital to ensure that graduates are adequately prepared for their occupational work and careers and that the gaps between the MSTP and the employment system are kept low (Spöttl, 2014).

2.2.4 The key points of the MSTP literature review:

i. The Skills Training Programme has been widely implemented in global further education institutions that emphasize vocation, technical, practical and hands-on learning (Colley, James, Diment, & Tedder, 2003). As stated in the National circular, the MSTP learning process must be circulated under the principles of the Competency-Based Training (CBT) approach (DSD, 2007a). Thus, if the E-portfolio needs to be introduced, the process must consider the features derived from this approach.

ii. The MSTP has different levels of qualification awarded depending on student's capabilities and achievement on that respective level. Each level has its own competencies that need to be achieved. For lower-level trainees, the capabilities expected are more focused on routine tasks, and the capabilities increase as the level rises. Thus, to introduce a system for those students, the research must take into account the students' abilities. The acceptance of the E-learning system based on student's level of training should be investigated.

iii. The MSTP's style of learning also places more emphasis on learning by 'practical work' or 'on-the-job training' where 60-80% of the training content is - practice/hands-on. This is similar in other countries which execute this program where the workplace setting is the main feature of its educational context (Tran & Nyland, 2013). There were critiques of this approach where sometimes the lack of resources and unwillingness of the industries to take part as training partners might cause the institution to have to bear higher equipment costs (Achtenhagen & Rger, 1996; Colley et al., 2003; Tran & Nyland, 2013). For institutions which cannot afford the cost, the quality of learning and training can be questioned due to them not complying with the standard required. Therefore, several concerns related to MSTP need to be taken into account so that the training institution can provide adequate facilities and satisfy learning quality.

iv. To sum up , there are four issues and challenges that need to be addressed according to the 10th Malaysian Plan for Vocational Education and Training Education, which are: to overcome the poor perception of MSTP, to uplift and harmonise the current MSTP curricula, to enhance the delivery system of MSTP

curricula and finally to upgrade the professionalism of the instructors to become more skilful and competent. The E-portfolio implementation aims to help addressing few issues such as enhance the image of MSTP institution, to enhance the learning methods to be integrated with online feature and to upgrade the IT skills of the students and instructors.

2.3   Literature review on online learning in the TVET context

Kafka & Dale (2013) reported that in countries like Australia, U.K and Singapore, the method of learning in TVET has been revised and improved to accept IT adaptation in the learning and training pedagogy. On-line learning, also known as Electronic learning (E-learning), which emphasises learning with the use of Information, Communication and Technology (ICT) facilities, has become a trend in major TVET institutions worldwide, especially in the developed countries, as they have high-tech capabilities that could provide established tools and facilities (Yasak & Alias, 2014). Prior to introducing an online learning technology in the MSTP, this research has to explore these trends in order to understand the acceptance of and the implementation of this technology for the TVET learners. To understand the literature on online learning in TVET in Malaysian and global institutions, the literature review focuses on the important points that frequently appear in past research, such as the mode of deployment and the important aspects that have made up successful implementation of the online learning in TVET.

Four matters need to be considered prior to implementation of online learning in TVET. These are: deciding the target user, determining the target learning domain, choosing the correct integration mode and, finally, determining the suitable tools, materials, software and activities involved. The user is the most crucial part that determines the success of a system. Thus, the system's users must be identified and comprehended in order to design a functional online learning application for them (Yasak & Alias, 2014). For example, if the users are learners with special needs, the application must be designed with features like voice recognition, be braille-enabled or touch screen-input enabled. If the users are from graphic or computer-aided courses that need high-tech applications on graphics and image, the system must be capable of providing the

requirements according to their needs, such as 3D/4D-enabled graphic application and enabling the use of a pen/stylus on the screen.

Apart from the system's users, the target learning domain that the online learning is required to achieve must be decided prior to the implementation of E-learning. Yasak & Alias (2014) mentioned that the ICT mediated learning seems to be more effective for cognitive improvement in the TVET sector. Although there are a few studies that show that online learning could impact the psychomotor and affective aspect (Konak, Clark, & Nasereddin, 2014; Starcic & Niskala, 2010), the majority of the research agrees that online learning has improved students' performance and perception of learning due to cognitive development throughout the process (Yasak & Alias, 2014). Thus, prior to introducing the online application to the learner, the objectives and aims of its use must be established to improve the cognitive, psychomotor, affective or soft skills of the learner. This is to ensure that the system can effectively perform as a catalyst to achieve the target set.

Based on the previous research, online learning in TVET has been used in three different modes: full deployment, partial deployment and as a supplement during learning. Yasak & Alias (2014) in their review stated that 11 of 20 research publications from the years 2003-2014 that had been analysed indicated that the adoption of ICT in teaching and learning in TVET was in full-deployment mode, while nine of them were using ICT in partial deployment. Only one of the studies demonstrated learning with ICT integration as supplementary in order to cater for learners with special needs. Most of the full-deployment mode involved the online distance learning programme which made ICT use compulsory for the students. On the other hand, the partial deployment which blends the ICT integration and hands-on training included most of the engineering and applied science courses such as web development, footwear design, computer-aided drawing and computer networking. These courses need practical training in the workshop, resources from the Internet as well as direct support from the teachers. As mentioned by Inayat, Amin, Inayat, & Salim (2013) in their study on investigating effects of collaborating through web learning, these E-learning methods supported with collaboration and feedback from tutor had contributed to increase student's comprehension of learning compared to doing it individually or full-deployment with the the system. This is also supported by research of SEVERI software

which was developed specifically for TVET learners who have severe difficulties with learning, where with assistance from various parties such as peers, parents and teachers, the system can potentially become an effective learning assistant to improve digital literacy of the students (Starcic & Niskala, 2010). Thus, based on these reviews, amongst all the modes, it was believed that the partial deployment could improve the skills training of the students with regard to preparing them for working in industry (Hallam, 2008; Yasak & Alias, 2014).

Next, the essential requirement which consists of tools and software should also be provided according to the facilities accommodated in an institution. Barrett (2006) suggested a list of a few suitable software packages and tools for E-learning depending on the Internet capabilities in an organisation, so the applications could be run smoothly. Additionally, Yasak & Alias (2014) recommended that the software chosen must meet the user's capability in terms of aspects like language, level of difficulties and having a user-friendly interface. In addition, sufficient materials to support the use must also be provided. Although past studies had shown that most of the online learning did not have a specific theory or model underpinning their processes, each of the projects had its own methodology and design which formed a structured process of deployment which encompassed activities related to the respective subject or course (Yasak & Alias, 2014). These activities are vital to ensure users comprehend the flows and functions of the system, thus motivating them to keep using the application until the project has been completed.

2.3.1 The key points from the literature review relating to online learning in TVET

i.   The challenges that need to be addressed before introducing E-learning are to decide the target group of participants, the learning areas for which enhancement is targeted , identify the mode of deployment and, lastly, to decide upon the tools, materials and activities to be involved within the process. These challenges were derived from the previous studies that had implemented E-learning in the TVET sector. However, the studies were limited to only 20 research studies executed between 2003-2014. These previous studies were

useful for my research in order to determine and consider important matters like user type, materials, mode of use and method of use.

ii.   Based on few research that implemented three ways of integrating E-learning into lesson, more satisfactory learning outcomes demonstrated from the integration of ICT and traditional method. This situation indicate that the blended mode adoption was more effective as compared to the fully IT-mediated mode or supplementary mode.

iii.   The learning goals of the IT integration during the course can be situated in the three domains, the affective, cognitive and psychomotor domains; however, there is more evidence to show that its effectiveness is more noted when the learning goals are of the cognitive domain.

iv.   The instructional design and theories do not appear to be considered or applicable in most of the implementation. However, this does not mean that the theory of learning is not crucial; perhaps the institutions may have used their "personal learning theory" or own development strategies to underpin their work.

v.   The tools and software chosen must take into account the aspects like cost, user's capability, language used, Internet capability, the activities embedded in the application and the support materials provided.

2.4   Literature review on the E-portfolio

This literature review focusing on the E-portfolio will explore three aspects: the purpose, benefits and issues arising from the previous studies. This information will provide a useful guideline in order to outline the implementation of the E-portfolio in the MSTP.

E-portfolios are one of the applications in a vast group of electronic learning technology currently deployed worldwide. The definitions of E-portfolios are numerous and range from compilation of achievement, as a personal collection space, as a medium in the student assessment process, and go as far as to support employee performance with regard to their contribution to the organisation. The Joint Information System Committee (JISC) in the United Kingdom is an organisation that supports the use of E-

learning, including E-portfolios on teaching and learning throughout the country. They stated the following:

> *"They are digital presentations of a student's experiences, achievements and aspirations for a particular audience – the digital equivalent of a paper portfolio – but the term often refers also to the underlying tools and systems" (JISC, 2015)*

In the Salzburg Research of MOSEP (More Self-Esteem with My E-portfolio), E-portfolio was defined as a "technology-supported learning method for the development of competencies whose entire developing process and results are demonstrated as well as illustrated and documented via digital information objects" (Hilzensauer & Buchberger, 2009, p.1) Learners collect rather save their self-contained and self-made products (artefacts) in a learning environment and reflect on their achieved goals and results.

Likewise, E-portfolios also can be defined as a personal, web-based compilation of work, assignment feedback, and reflection used to indicate key skills and achievements in a variety of contexts and time periods (Barrett, 2005; Reardon, Lumsden, & Meyer, 2005; Turhan & Demirli, 2010). This collection consists of elements of text, graphics, or multimedia which can be accessed through a website or other electronic media such as CD-ROM or DVD. A learning E-portfolio is modelled as Figure 2.3 shows below:
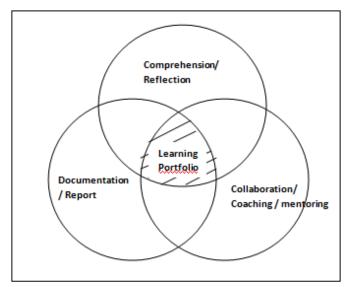
Figure 2.3 Learning E-portfolio perspectives (Barrett (2005))

The learning portfolio is a flexible, evidence-based process that combines reflection and documentation. It engages students in ongoing, reflective, and collaborative analysis of learning. It focuses on purposeful, selective outcomes for both improving and assessing learning. Barrett (2005) proposed that the growth and development of a learner in a specific time duration can be assessed through a series of E-portfolio processes, such as reflection, goal setting, and self-assessment. In her research on E-portfolio programs as strategic tools, Barrett (2010) perceived that students should have some academic freedom to include other works which best present their overall achievements and abilities.

Typically, according to Jaryani (2010) there are three main types of E-portfolio, although they may be referred to using different terms: developmental (e.g., working), reflective (e.g., learning), and representational (e.g., showcase). A developmental E-portfolio is a record of things that the owner has done over a period of time, and may be directly tied to learner outcomes or rubrics. A reflective E-portfolio includes personal reflection on the content and what it means for the owner's development. A representational E-portfolio shows the owner's achievements in relation to particular work or developmental goals and is, therefore, selective. When the latter is used for a job application it is sometimes called the Carrier portfolio. The three main types may be mixed to achieve different learning, personal, or work-related outcomes, with the e-portfolio owner usually being the person who determines access levels.

From the Becta report in 2007, various interview responses were received from Further Education students in the research called 'Impact Study of E-portfolios on Learning', such as "*A tool to represent yourself through a CV or compilation or achievement*"; "*It is an electronic form of a person's identity*"; "*An opportunity to market yourself and show your achievement*" and "*An online resource where a person can store information about himself and publish to other*"(Becta, 2007, p.6).

It was also found in the Becta study that users perceive the E-portfolio as focused on learners' needs and use (Becta, 2007); however, this application can also be used by instructors, teachers, lecturers, employees, and employers and even for individual people. Among teachers, some saw an E-portfolio as a 'collection of evidence' for a purpose and made connections with the former paper-based records of achievement; others saw the benefits for E-portfolios in supporting personal organisation, reflection

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and presentation to a range of audiences (Becta, 2007). For individuals or employees, the E-portfolio was perceived as a tool to compile the best work, the performance record (for appraisal purpose) and as a collection of favoured articles or materials from the Internet or any other source. Ultimately, despite people's different perceptions of E-portfolios, they mutually agreed that this electronic application was developed mainly for virtual storage, collection and compilation of materials depending on what they intend to do with it or use it for.

A foremost strength of E-portfolios is that they can be used for a range of purposes, including formative feedback and summative assessment, application for employment, professional accreditation, transition between institutions and/or employment, and for less high-stake purposes such as supporting and recording personal growth and learning (Barrett, 2005; JISC, 2008). Studies have shown that an E-portfolio is the product created mainly by learners, which contains a collection of digital objects (artefacts), combining various media like audio, video, text and images (Abrami & Barrett, 2005) articulating experiences, developments, achievements and learning. Moreover, Buzzetto-more & Alade (2008) reported that Electronic portfolios have been found to be a valid way to document student progress, encourage student involvement in assessment, showcase student work samples, promote students professionally, and provide a method of showing student learning outcomes and curriculum evaluation. This application was alleged to be beneficial for students where it also can be used to demonstrate achievement, to record progress and to set targets (Freitas & Mayes, 2004), while other participants could also be involved in the use of an E-portfolio, such as teachers, skilled workers or anybody who wants to record their achievement or even a piece of work for different purposes like professional development, personal collection and others (Klein, 2012).

In addition, Owen (2011) in the research on E-portfolio deployment in Continuing Professional Development (CPD) stated that this application was used to record progress of work and compile tasks by a physiotherapist during service. This application was about to replace the traditional method, which was a paper-based report. The same situation was experienced at the University of Nebraska in 2008, where they deployed an E-portfolio for performance appraisal of the librarians. The university has moved from a paper-based reporting of evaluations to an all-electronic

environment for annual performance reviews as well as for the purposes of reappointment, tenure, and promotion decisions. The title of the new system is myMAPP—Mapping Academic Performance through E-portfolios (Parker & Hillyer, 2008). In the United States of America, the National Learning and Infrastructure Initiative (NLII) and American Association for Higher Education (AAHE) established a joint project, a virtual community to explore the power of E-portfolios (Treuer, 2004). There is a programme called the Leadership Development Program which runs the student E-portfolio project for several universities. Based on this programme report, Treuer (2004) reported that E-portfolios are a growing trend in higher education. The students were using this application to keep on track towards gaining a degree. The survey also showed that students want more in-person and online advising opportunities during courses (Treuer, 2004). In addition, countries in Europe established an E-portfolio project (http://www.europortfolio.org/) for promoting research and development of E-portfolios for lifelong learning. This would indicate that the utilisation of E-portfolio applications has recently improved significantly, becoming acceptable in schools and higher education institutions in Europe and the United States. From these studies, it can be seen that the E-portfolio was believed to be a tool to record progress of work in order to achieve the final outcome or learning targets.

Furthermore, Barrett (2005), in her brief explanation on researching E-portfolio and learner engagement, noticed that the growth and development of a learner over a specific period of time could possibly be assessed through a series of E-portfolio processes such as reflection, goal setting and self-assessment. Chang (2001) indicated that web portfolios generate numerous effects, such as controlling the learning process, self-examining the advantages/disadvantages, and enhancing student development, and are beneficial to learning. In addition, a study that evaluated the online learning model, involving reading, reflection, display and doing (R2D2), which was proposed by Bonk & Zhang (2006), showed that reflection is derived from the E-portfolios obliging students to conduct self-assessment. This is supported by McMahon & Luca (2006), who regard E-portfolios as a self-monitoring and evaluation tool for online learning, which is also agreed by Lowenthal, White & Cooley (2011): remodelling the E-portfolio process using the 'gate system', which introduces a certain proficiency as the 'gate' in the E-portfolio, could improve the assessment and programme evaluation. Other than that, it was suggested that the E-portfolio could play important roles during

learning, such as enhancing student's motivation to accomplish the target required (Coolin & Harley, 2010), and could improve the communication and feedback between students and peers as well as with the lecturer/teacher (Kicken, et.al., 2009; Krämer & Seeber, 2009). From these studies, it was noticed that E-portfolio application could support reflection of students through self-assessment and self-monitoring, recording growth and development, improve student's motivation and could also enhance communication during learning.

Other research on E-portfolio implementation in several aspects of student development shows significant improvement on the target areas. The E-portfolio was effectively used as a tool to satisfy the requirements of the student's job demands (Nasab, et.al., 2010) and to assess generic competence in distance learning education (Krämer & Seeber, 2009). Other than that, it was also believed that the E-portfolio could be implemented as a tool to support life-long learning education (Smallwood, et al., 2007), professional development (Klein, 2012) and as evidence compilation storage for recognition of Prior Experiential Learning (Karlen & Sanchirico, 2009). Based on the 2012 Survey of Technology Enhanced Learning for Higher Education in the UK, Walker, Voce, & Ahmed (2012) reported that 76% of the students participating in the survey were using E-portfolio software during their courses. It was ranked fourth of the software being used in the UK higher institution below plagiarism detection software, e-submission tool software and e-assessment tool software. By looking at these circumstances and opportunities, I was in agreement with Lorenzo & Ittelson (2005) where they mentioned that it is impossible to precisely determine how many institutions have adopted E-portfolio systems currently because their adoption continues to grow. This shows that the E-portfolio is being widely accepted in developed countries for their higher education as well as for further and vocational education due to its flexibility to be deployed for education and life-long learning, for personal use or for employment and job applications.

However, in the vocational and education training sectors, few countries have implemented this application as part of their E-learning education support programme (Altahawi, Sisk, Poloskey, Hicks, & Dannefer, 2012; Cameron, 2012; Martín, Fernández, & Sanz, 2012; Matsom, Duggan, Tracy, & Stott, 2015; Matsom, Stott, & Tracy, 2013; Sluijsmans et al., 2006). E-portfolios are an alternative form of learning

and assessment that are particularly attractive to the vocational educator because they include the assessment of skills and performance rather than the mere recall of memorised facts (Turhan & Demirli, 2010). Furthermore, E-portfolios serve the interests of business and industry as well by forging a connection between activities in the classroom and real life. However, the successful achievement of these anticipated outcomes depends upon the purposes, practices and structures that guide implementation of this new form of learning and assessment in vocational education. Turhan & Demirli (2010) conducted a quantitative study to obtain the perceptions of vocational education teachers and students towards the use of E-portfolios in the United Kingdom, Denmark, Romania and Turkey via questionnaires. This showed that both teachers and students found the E-portfolio process was necessary in vocational education as part of the learning process for collecting evidence, monitoring work progress, and assessing skills and knowledge as well as measuring student's reflection on lessons.

Based on the results of a Leonardo da Vinci project (*MOSEP - More self-esteem with my ePortfolio*), E-portfolios are known as a technology-supported learning method for the documentation of competency development (Hallam, 2008). The project outlined a new training concept for teachers and tutors using open source E-portfolio software tools. They quoted an opinion from Hilzensauer (2007), that work with E-portfolios is not only a question of tools, but a sustainable measure to support self-directed learning. This is supported by Kicken et al. (2009), who reported mixed methods research that vocational students in The Netherlands who receive feedback and advice to develop their self-directed learning skills using E-portfolios are more motivated in learning, formulated better learning needs, completed more practical assigments and acquired more certificates than students who only receive traditional feedback throughout the course.

In Malaysia, the University of Technology Malaysia (UTM) is the only Higher Institution which deploys this application to their under- and post graduates (Norazman & Rahman, 2013), while, certain other universities have managed to engage with it for selected subjects and purposes, such as in Universiti Pendidikan Sultan Idris (Nor et al., 2012) and the University of Malaya (Yusof et al., 2013). E-portfolios have been positively perceived to support learning and communication between peers and

lecturers (Norazman & Rahman, 2013), nurture reflective thinking (Nor et al., 2012) and could encourage creative thinking and ability to demonstrate creativity through the showcase function (Yusof et al., 2013). The latest research was executed by a team in the Universiti Tun Hussein Onn Malaysia, who managed to identify the key indicators that they expected to be featured in an E-portfolio for a competency-based assessment programme. The study obtained views of the instructors from the vocational and skills training education related to important features that need to be included in a Skills Programme E-portfolio. However, no study involving the real implementation of the E-portfolio in the Malaysia Vocational and Skills Training Education has yet been reported.

There are broad perspectives on E-portfolio purposes and focuses in different areas. From the education view, employment view and also for individual satisfaction, this application seems acceptable in most situations. However, despite all the advantages discussed, there are also some drawbacks that need to be considered in order to proceed to the next step of good and smooth implementation. An unclear purpose and process of implementation, the user's ability and proficiency, the assistance and supports needed, the software- and hardware-related issues and the limited facilities were the most-raised issues in the E-portfolio literature reviewed.

Joyes & Smallwood (2012) mentioned that, to achieve successful implementation of this application, a clear and understandable purpose and process of use must be determined and disseminated to the users. This is supported by Nor et al. (2012) where they reported that the students faced problems in understanding the purpose of the application and meaning of the respective processes due to difficulties in comprehending the structure of the system's process flow. It is important to ensure that the system is suited to the campus/institution's structure so the users will not be confused (Ring & Ramirez, 2012). The system's design should not be developed to please the developer or the administrator who have designed it, but it must prioritise the users' (student and teacher) needs (Ayala, 2006). As Gerbic, Lewis, & Northover (2009) reported, difficulties in understanding the use of the system's function has had a significant impact on the performance of the E-portfolio implementation project; thus, the purpose and the process of implementation play a vital role in attracting students' interest to engage with and maintain fidelity to the system. Further research is necessary

to identify the underlying E-portfolio processes in order to make sure they are encouraged or scaffolded in E-portfolio tools, and are used appropriately by teachers and students. Furthermore, the relationship between process and outcome and how these processes impact on the learner and learning outcomes also need to be explored and investigated (Abrami & Barrett, 2005).

Issues concerning the user's ability and proficiency in ICT, both hardware and software, have also been raised due to its impact on the performance of the E-learning engagement (Mills, 2013; Yasak & Alias, 2014). Computers were perceived as a peculiar thing that had suddenly begun to exist in users' lives. This situation was pertinent especially for seniors who had spent many years using traditional methods and for young people from rural areas (Krämer & Seeber, 2009). Even though ICT has been widely deployed all over the world, there are some places in rural areas that still have limited access to these facilities, causing people to experience lack of knowledge and skills in this technology. Consequently, this challenge needs to be overcome by providing sufficient assistance and support. As stressed by several previous researchers, training in this application, engagement and support from the practitioners, administrators or peers is vital for the users in order to support them to accomplish the targets aimed for (J. O. Brown, 2011; Felce, 2011; JISC, 2008; Krämer & Seeber, 2009; Mills, 2013; Nor et al., 2012; Ruhizan et al., 2014; Zainal-Abidin, Uisimbekova, & Alias, 2011). In research comparing two groups of students where one did receive advice and assistance during the E-portfolio session whilst the control group did not, the test group showed significantly better results on the final outcomes (Kicken et al., 2009). Kicken et al. (2009) also mentioned that, along with the process of use, advice and consultation are needed to ensure the students are kept motivated and to increase their confidence to attain the objectives of using the system.

Other than the issues stated above, previous studies have also mentioned issues related to the software and hardware being used in the implementation of the E-portfolio. The user interface of the system needs to be practical and attractive so it will encourage users to explore it (Barrett, 2006; Felce, 2011; Ring & Ramirez, 2012). This issue, however, requires more effort in development as some of the E-portfolio software has already set the user interface and does not allow customisation. Thus, to cater for this issue, another alternative might be considered, such as converting the existing language

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package to a language that is comprehensible to the prospective users or choosing another software package that offers a customised user interface. Issues on technical robustness and flexibility of the system have also influenced the survivability of the system (JISC, 2008; Peacock et al., 2010). A good E-portfolio system should feature compatibility in any platform, a database and should be easy to maintain. An inefficient system which always fails and 'hangs' could decrease the usage statistics due to it being a waste of time and effort to complete the process. Thus, choosing a suitable and efficient technology, matching the application and the hardware will be a great challenge for the organisation/institution prior to the implementation of the system.

According to JISC (2008), learners see the provision of adequate facilities to support the use of this application as a priority . The necessary facilities and requirements include computers, Internet, devices and other related peripherals such as a printer or scanner. This is supported by Ruhizan et al. (2014), who stated that, in Malaysia, it was quite a challenge to provide an organisation with a stable Internet line due to the high cost. The students had to make an extra effort to complete the assigned tasks, like having to wait for a certain time because there were not enough computers with Internet access. Thus, the percentage of students who complete the task would decrease. The lack of user access to ICT facilities seems to be a practical barrier to individuals' engagement with the system (Owen, 2011; Peacock et al., 2010). Therefore, prior to the execution of this system, careful planning on facilitating the required infrastructures needs to take place in order to achieve the optimum target of the implementation.

2.4.1   Key Points from the E-portfolio literature review

Based on the literature and the aim of this research, which is to explore the purpose, benefits and challenges of the application, it can be concluded that the E-portfolio literature review has highlighted the outcomes of previous research as follows:

a. E-portfolio can be used as a developmental portfolio (records, artefacts), learning portfolio (assessment, learning, reflection) or showcase portfolio (compilation of achievement).

b. It can be used and provide benefit for educational (learning) or carrier (employing) functions and also for personal compilation.

c. In education, it shows that the E-portfolio could support reflection through self-regulation and self-monitoring. It could also improve students' motivation and enhance communication during learning. It is also believed that the E-portfolio could be a tool to record progress of work, as a medium of assessment and to compile learning outcomes as evidence of learning. In the employment part, the E-portfolio could become a tool for performance appraisal through records of achievement and could be personally used by someone to store their CV for job applications. Several studies showed that an E-portfolio could also be used for individual interests, to keep and compile their personal achievement or memories.

d. The issues and challenges in E-portfolio implementation can be summed up as: to provide a clear purpose and process of implementation, and to identify the user's ability and proficiency so that sufficient support and assistance could be provided. Training and dissemination of information on how to operate the system also needs to be conducted in order to ensure that the users can comprehend the objectives and the project's target. Other than that, the software- and hardware-related issues and the limited facilities also play a crucial part, especially when related to an organisation's costs and investment. These matters need to be designed and provided based on users' requirements and capacity so the implementation will achieve the target set.

Several studies between the years of 2013-2015 that inspired and motivated me throughout this project were listed in the Table 2.5.

Table 2.5: Summary of literature review comparing E-portfolio projects from 2009-2015

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
1.	Galatis, Leeson, Mason, Miller, & O'Neill (2009)	The VET E-portfolio Roadmap.	To outline the VET E-portfolio goals, implementation strategy and guidelines for practitioners.	The VET E-portfolio implementation was based on the 'business processes' activities which comprise: source, manage, communicate, and present. The VET E-portfolio reference model expanded the 'business processes' by adding the 'related service' features which detail activities in each of the processes.	The roadmap goals of the VET E-portfolio are: portability, verification, privacy, ownership, access control, infrastructure, storage, embedding and transition.	The four activities included in the 'business process' seem acceptable and similar to common E-portfolio implementation.
2.	Gerbic et al. (2009)	Student perspectives of E-portfolios: A longitudinal study of growth and development.	To investigate the E-portfolio roles in charting the growth and development of a student's learning.	Longitudinal study This interview question was open-ended and was answered by 80 students (83%).	- The greatest challenge was being able to use the technology. - The main difficulties referred to understanding what the software did, navigating it, creating views, and the time involved in using it. - However, a few students did recognise the learning value of the E-portfolio. - The highest percentage of student responses were that the E-portfolio could provide a place to store their coursework.	The challenges arising from this research can be compiled as technology-adopting issues which involve difficulties in comprehending the system's functions and how to operate certain functions according to activities' instructions. The E-portfolio process plays a crucial part here in ensuring that the users could do what they were supposed to do.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
3.	Krämer & Seeber (2009)	E-portfolios as generic assessment tools in a distancE-learning study course.	Generic assessment was declared as part of competence besides being domain specific. Thus, E-portfolio could be a tool to evaluate generic competencies.	Competence Theory-Generic competence. E-portfolio used to assess social, personal and learning competencies of students on a distancE-learning study course. The method used: qualitative methods such as observations of learning diaries and document/evidence reviews.	E-portfolio could be an assessment tool to develop and assess generic competencies in a distancE-learning study course. However, it needs to consider matters such as: provides training to users, practice to improve, design variety of tasks to be evaluated and the evaluation time frame. It is also suggested that special certificates be awarded to students who accomplish the target grades.	The key point here is E-portfolio assessment needs to be practised regularly as well as sufficient training being provided. A merit such as the certificates of achievement could enhance the motivation of the students to keep using the application.
4.	Kicken et al. (2009)	The effects of portfolio-based advice on the development of self-directed learning skills in secondary vocational education in Germany.	To investigate whether a supervision meeting, in which students receive specific advice on how to use a development portfolio to monitor their progress and plan their future learning, helps them to develop self-directed learning skills and improve their learning in the domain.	Self-directed learning concept adopted. A mixed-method approach encompassing a review of assessment records, observation by supervision meeting and semi-structured interviews.	- Students who receive advice develop their self-directed learning skills better than students who only receive feedback – this was largely confirmed by the reported results. - Students in the advice condition showed higher learning than students in the feedback-only condition – this was supported. - Students who receive advice during supervision meetings appreciate these meetings more and perceive the sessions as more effective than students who only receive feedback – this was also supported.	Advice and feedback are vital to improve the student's motivation and responsibility for learning. The mentor/coach/ instructor of the system would have to provide a solution or a suggestion regarding improvement rather than only giving feedback without any recommendation.

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	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
5.	Connolly, Gould, Hainey, Waugh, & Boyle (2010)	The implementation of Virtual Learning Environment and E-portfolio in private vocational training organisations.	The objectives of this research are to explore the use of E-portfolio in the private vocational training companies, to stimulate further research in this area and to set the foundation of a model or framework that could support an effective implementation.	Case Study which involved trainees of one organisation. The survey questionnaires were used to measure participants' acceptance of the E-portfolio system and to evaluate the system's effectiveness.	- The authors concluded that the E-portfolio research in this area (vocational and skills training) could offer a rich source of future research. - It would be difficult to replace the practical work with the E-learning; however, other parts of learning like producing multimedia and supporting communication could be supplemented by this type of E-learning.	- The practical work that required real tools and materials is the main training process in the vocational and skills education. Thus, it is not appropriate to replace it with the 'visual' training. - The E-portfolio, however, could be supplementary to the on-the-job evidence, such as to keep the videos/audio/ reports of the practical work that had been carried out.
6.	Turhan & Demirli (2010)	The study of E-portfolio implementation in the Vocational Education (VE) Sectors: Exploring the views of teachers and students in the UK, Denmark, Romania and Turkey.	To investigate the critical elements of the E-portfolio process.	Questionnaires to teachers & students.	- Highest mean from the teacher data showed E-portfolio could be an assessment method in VE. Meanwhile, the highest mean of the students' data showed that an effective ICT (Information,communication, Technology) usage should be provided in the learning process. - In conclusion, both teachers and students agreed that the E-portfolio process is considered to be necessary in the VE so that the sector will experience a new dimension of learning.	The process of E-portfolio deployment must take into consideration adding features that could enhance the ICT skills of the participants.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
7.	Joyes, Gray, & Hartnell-Young (2010)	Effective practice with E-portfolios: sharing information about UK experiences of the implementation, organised under the JISC (Joint Information System Committee).	To inform the analysis of E-portfolio implementation based on 21 funded projects conducted in the UK.	The multimodal approach was used to disseminate findings of the lessons learned. The purpose matrix was presented to map the institution's involvement in the project.	To influence E-portfolio practice in the institutions, two aspects need to be taken into account: support the projects that are feasible and develop a project that is effectively managed so the benefits of the E-portfolio can be realised. Emerging concepts: the threshold approach was introduced to support the ability of less capable practitioners to use the E-portfolio.	Crucial issues that need to be taken into account in order to develop the E-portfolio in the MSTP are: - An implementation must be supplemented with a designated project which includes a complete process activities of implementation. - The threshold concept seems a useful guideline by which to design the E-portfolio project in the research.
8.	Nasab et al. (2010)	The study of the E – portfolio's role in satisfying technical students' job demands. The study was conducted in a technical institute in Iran.	The E-portfolio was suggested to be used as a tool to support students' competencies in order for them to find a suitable technical job.	Participants were required to answer a survey questionnaire related to perception of the E-portfolio's role as a supporting tool in finding jobs.	Results showed that students were inclined to use the E-portfolio as a tool to develop their résumés.	This study inspired the idea to extend the E-portfolio use to industry and employers/companies.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
9.	Peacock et al. (2010)	The study investigates tutors' views about implementing an E-portfolio to support learning and personal development in further and higher education in Scotland.	Apart from obtaining views related to the potential of the E-portfolio, this study aims to provide evidence about the challenges and offer suggestions on how the institutions may address the issues.	Twenty-three semi-structured interviews were conducted with tutors in a range of subject areas, from Scottish further and higher education.	It was believed that the E-portfolio could play a positive role in supporting the learning environment, encouraging personal development, and assisting student transition, as an assessment, and could support a more reflective approach to studies. However, certain issues need to be addressed such as tutors' lack of access to Information Technology (IT), lack of understanding about their role as academics, and the definition of personal development and reflection. Strategies suggested to overcome the issues included an effective staff development plan, institutional commitment and the formation of a tutor support network.	The issues need to be taken into consideration. Access to IT facilities and the system's purpose must suit the learning environment so that the risk of a lack of understanding on the tutor/instructor's part can be reduced.
10.	Felce (2011)	This is a Doctor of Professional Studies thesis, which conducting research into developing an E-portfolio-based pedagogy for work-based learners.	An inclusive approach model was developed and employed with the use of the E-portfolio located at its heart.	Qualitative action research was deployed throughout the study.	The study showed that the use of the E-portfolio has met the requirements of learning and personal development of the students. The innovative creation was a theorisation of different types of users depending on their skills and capability.	This thesis is very useful in providing information on how E-portfolio research could be a novelty and may contribute to the body of knowledge. The innovation has also inspired me to think about the enhanced technique to address issues like the variation in user capability when operating an online application.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
11.	Zainal-Abidin, Uisimbekova, & Alias (2011)	A study on post-implementation strategy for the E-portfolio adoption among students in a Malaysian public university.	The low involvement of students in the E-portfolio system has raised concerns among promoters. Thus, the factors and reasons for this need to be investigated in order to plan strategies to improve the statistics.	Both quantitative and qualitative methods were deployed, encompassing interviews, questionnaire and observation, to four groups of people: the students, academic advisors, deputy dean of faculties and selected personnel from the system's development team.	The results showed that user awareness of the system's importance and its usefulness has a great influence on the level of adoption, as well as insufficient training and support and other individual, system and organisational factors.

Five strategic operations have been proposed to create a strategic plan of implementation at both university and faculty levels, to increase user awareness by promotion, branding, training and support, to enhance the system's functions to include new features like job search, calendar, etc., to improve the ICT infrastructure and, finally, to promote more quality advising by the academic advisors. | The most important point here is to ensure the users fully comprehend the objective of the system, the motive of the implementation and how they can benefit from the system. |
| 12. | Lowenthal et al. (2011) | Remake the current assessment and programme evaluation by introducing the E-portfolio and a system of gates to improve student assessment evaluation. | The objective is to redesign a programme's assessment and evaluation plan around the use of electronic portfolios, and a system of gates focusing on the larger assessment/evaluation framework was introduced. | This remodelling was still at the early stage, so it was difficult to obtain data on its effectiveness.

However, early observation indicated that the process was working just as designed. | Initial results showed that the students are working on their portfolios throughout their programmes – beginning with their first course. They are also getting feedback at each gate about how they are performing and any gaps in their knowledge (based on the artefacts submitted). Over time, though, it is assumed that courses will need to be updated, | This is a working paper where the effectiveness of the strategies had not yet been assessed. However, the idea of introducing 'The Gate System' to MSTP seems to be unsuitable due to the nature of the MSTP structure. Perhaps, if the E-portfolio system had been established and become a regular practice in the |

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					artefacts and rubrics improved, and the system management processes tweaked.	MSTP, this approach might work for it.
	Researcher	**Title/Scope**	**Aim/Issues**	**Theories/Concept/Methods**	**Findings/Discussion/ Suggestion**	**My observation/ Analysis/Thought**
13.	Ring & Ramirez (2012)	This paper intends to disseminate the E-portfolio implementation processes that have been used for the assessment of general education competencies. In addition, the outcomes of the project are also elaborated.	The project objective is to promote reflection on learning and documenting experiences during the course by using the E-portfolio, so that the competency needs to be achieved could be assessed accordingly. The project employed a Logic Model, The Theory of Change, where there are three expected outcomes, which are short, medium and long term.	Qualitative methods were deployed, including observations, interviews and artefact reviews.	Outcomes: - E-portfolio was becoming an active part of the dialogue about student learning. However, some students only paid attention to the quality of communication in order to achieve communication competencies rather than for its content. - Although online feedback was provided, most of the students preferred to meet lecturers face to face. Issues: - Slow adaptation by both students and lecturers due to lack of motivation, misunderstanding of the project's objectives, lack of exemplars and references, and uneven integration of the system with the curriculum. Suggestions: - Initiate workshop and training to enhance understanding	This paper presents findings after six-year implementation of the E-portfolio on the campus (2006-2012). Even after six years, many issues were still arising and it was found that more strategies needed to be drawn out and implemented. The key point here is that, in order to introduce this system for the first time, the purpose and processes need to be clearly defined, explained and demonstrated, and provide sufficient reference to the user.

					- Implement the E-portfolio campus-wide awards program - Further research on students' satisfaction and system's weaknesses.	
	Researcher	**Title/Scope**	**Aim/Issues**	**Theories/Concept/Methods**	**Findings/Discussion/ Suggestion**	**My observation/ Analysis/Thought**
14.	Nor et al. (2012)	This study aims to enhance learning through E-portfolio processes among the English for Second Language (ESL) Students at a Malaysian Education University.	The study intends to discover the kinds of learning opportunities that a portfolio process can provide from the ESL graduate students' perspectives and the lecturers' perspectives of moderating the teaching and learning activities. It also aims to illustrate the kinds of challenges faced while engaging in the E-portfolio process.	The qualitative method was employed where a case study has been designed. The online questionnaire, chat interview and artefact analysis were conducted for data collection purpose.	Both students and lecturers have positive perspectives on the learning opportunities provided through the use of E-portfolios. However, they have also highlighted some of the limitations and concerns that they have encountered during the process. It was found that students and lecturers did not face many challenges in the technological aspect, but they did face many challenges in the construction of knowledge and making meaning out of the process in which they engaged. On the other hand, the lecturers faced with many issues in moderating the E-portfolio. The study suggests some ways to support the use of process E-portfolios in enhancing the learning process in the teacher education context.	This paper contributes to the enormous amount of knowledge through its findings. The important parts related to the issues which arose from this study, such as the users' difficulties in understanding the meaning of each process, issues with users' confidence, shyness and insecurity and the appropriateness of student discourse when participating in this program's online-community of practice.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/Suggestion	My observation/Analysis/Thought
15.	Norazman & Rahman (2013)	This study analyses the undergraduate students' perceptions and experiences regarding the use of E-portfolio with the main purpose of usage, the impact of peers and lecturers on learning, the benefits gained and the system's usefulness.	This study aims to examine the understanding of students related to the system and to explore students' views on how they can be attracted to use it. The perception post-implementation has also been investigated to see the system's impact on the students' learning processes.	Data was collected from 12 undergraduate students by conducting focus group interviews involving three faculties that have higher E-portfolio usage among the undergraduates.	The findings of the study showed that students are able to improve their learning through the interaction between their peers and lecturers, self-knowledge, developing skills that are relevant for job applications and also realising the importance of reflective learning and the advantages of using the E-portfolio system.	UTM (Malaysian University of Technology) is the only public university that has seriously implemented the E-portfolio system for its undergraduate and postgraduate students since 2011. Therefore, to learn their experiences about how they do it and to what extent the system has been successfully implemented is vital to strengthen my understanding. The E-portfolio seems to give a positive result to improve students' learning and develop new skills, and could be relevant for job finding.
16.	Yusof et al. (2013)	The paper investigates the use of an E-portfolio in a creative-writing classroom where students use the system to showcase both the finished product and the stages undertaken along the process.	The students need to develop a concrete poem using the E-portfolio and chart the processes until they reach the finish line. The study intends to explore how this activity could have an impact on the students' learning processes.	The document reviews deployed analysed students' work and artefacts.	This activity discovered an independent learning process of the students through a three-phase cycle, planning the task, monitoring the progress and reflecting by making a correction based on feedback and comments. The E-portfolio provides a space to showcase their creative ability, with the added aspect of providing insights into their creative processes of production as well as it could encourage personal	This paper is interesting as they were trying something new and creative. 'Creativity' may be considered to be included in the features that should be explored in my research.

	Researcher	Title/Scope	Aim/Issues	Theories/Concept/Methods	Findings/Discussion/ Suggestion	My observation/ Analysis/Thought
					perspectives and intrinsic interest.	
17.	Baris & Tosun (2013)	This paper studies the influence of the E-portfolio Supported Education process on the academic success of Vocational Students in Turkey.	The study aims to integrate the E-portfolio with Facebook application and deployed those integrations in the class activities as part of the supports to learn the concepts and skills in the vocational course. It also intends to investigate the effect of the integration towards student's behaviour.	Both quantitative and qualitative methods were used where the pre-test and post-test were applied in the control group trial model. In addition, the personal information questionnaires were also conducted to collect participants' personal information and ICT skills.	The post-test scores showed improvement, where it can be said that the E-portfolio-supported education has influenced the success of the students. The E-portfolio has also been shown capable of enhancing the students' ICT skills.	This study inspired this research as it was applied to the vocational and technical skills education. The results provided imperative input to this research. However, no further details on the E-portfolio process have been explained.
18.	Mohd Bekri et al. (2013)	This study is about designing a conceptual framework for the development of a Malaysian Skills Certificate (MSC) E-portfolio.	This study aims to produce an appropriate framework of the E-portfolio system for the MSC to be applied in vocational education in Malaysia. This is done to improve the existing skills training system, in order to enable the country to produce a high-quality, highly knowledgeable, innovative and competitive skilled workforce.	A modified Delphi technique was applied. The first step involved a survey questionnaire for the MSC trainer/instructor. Next, the framework was developed based on the results of the survey.	The five processes of E-portfolio development for MSC were revealed, which were Analysis, System's design, Database design and development, Application development and finally the Evaluation of the system. The conceptual framework developed encompasses the five elements, which were the elements of MSC E-portfolio, MSC E-portfolio Model, the system development cycle model, the Mahoodle open source software and, finally, the virtual learning space.	This paper became my primary reference as it was carried out in the same domain with the similar intentions. Thus, the conceptual framework can be simplified as: i. The elements of MSC E-portfolio – Purpose ii. MSC E-portfolio Model – Process iii. The system development cycle model – E-portfolio development process iv. The Mahoodle open source software – Tools/Software

						v. The virtual learning space – other elements such as collaborative, social network, communication, etc.
	Researcher	**Title/Scope**	**Aim/Issues**	**Theories/Concept/Methods**	**Findings/Discussion/ Suggestion**	**My observation/ Analysis/Thought**
19.	Ruhizan et al. (2014)	The study explored the readiness of MSTP for the use of E-portfolio.	The studies intends to investigate the readiness in terms of a few aspects: the ICT skills and knowledge of the instructor and students, the facility conditions in the centre and, finally, the views of both parties regarding the E-portfolio suggestion to be implemented in the MSTP	A quantitative method via survey questionnaires were used for teachers and students of MSTP from two government-owned MSTP-accredited centres.	The results showed that government-funded institutions, the students and the instructors have high basic ICT skills, the facilities to accommodate the E-portfolio application were sufficient, and both students and instructors viewed that the transformation from printed to digital portfolio needed to be carried out.	This study was implemented in the MSTP centres which were government funded, which have complete facilities, according to the DSD reports on the star rating. My research is focusing on a private MSTP centre which has no financial support from the government and yields its own revenue from student fees. However, it was a positive side to see that, in the MSTP public centres, the E-portfolio was accepted and its implementation was welcomed .
20.	Rahim (2015)	The study investigates the E-portfolio indicator for competency assessment and virtual learning in the MSTP.	The study aims to produce an indicator of the E-portfolio as a tool for assessment and virtual learning in the MSTP.	Three Delphi stages were employed. The first stage involved a literature search to produce an initial 32 indicators. In the second and third stages, the indicators were further discussed and reviewed by selecting few expert panels until it reached mutual consensus.	Ultimately, 22 indicators for virtual learning and five indicators for competency assessment were identified as important in relation to the MSTP. This study has provided a clear picture of the E-portfolio indicators that are important in the MSTP for virtual learning and competency assessment.	These research findings contribute to be a validating guideline for the E-portfolio application that has been performed within my research.

2.5   Learning theory related to E-portfolio implementation in the MSTP

The theory of learning underpinning the use of E-portfolios as a pedagogical tool needs to be aligned with the concept of MSTP and at the same time understood by all who use the E-portfolio, both students and tutors, as well as the administrator or system designer. This will influence the pedagogical approach to be applied. Without a clear understanding by both tutor and learner, there may be a clash of paradigms and, consequently, of practices. The E-portfolios might provide a variety of benefits but the functionality of the system must depend on rigorous pedagogical principles that relate the portfolios to the learning that takes place in the curriculum (Gaitán, 2012). Although there are several studies that indicate that there are no exact theories or models that have been proved to be better than others, and even though some of the research has not adopted any theories at all, the E-portfolio implementation has still had a significant impact on the learning process using their own developed model or concept (Yasak & Alias, 2014).

To choose appropriate theories or models that will be a guide towards a successful implementation of E-portfolio in the MSTP, I had to find the pedagogical root of the MSTP. This directed me to several theories that seemed suitable to be applied in the activities process of the E-portfolio. In the MSTP, terms like practical training, cognitive and psychomotor development, affective enhancement, progress-based learning, objective and hierarchical-based instructions, hands-on training, project-based assessment and many other vocational and technical terms were circulating in the pedagogical approach and curricula structures (Leong, 2008; Othman, 2003; Pridham, O'Mallon, & Prain, 2011; Sluijsmans, Straetmans, & van Merriënboer, 2008).

In this research project, I aim to use the E-portfolio mainly as an assessment medium blended with the traditional approach. In addition, the application also intends to improve the quality of report/assignment developed based on the practical activities and act as a medium to gain feedback so that the correct steps will be demonstrated and included in the development of the final outcomes. As explained earlier, the MSTP requires learners to be examined on both practical and knowledge assessment for each module in order to complete the whole level. The assessment where the E-portfolio was involved focused only on the practical-based part due to the knowledge or cognitive assessment still needing to be fully carried out on paper. Furthermore, the E-portfolio

can also be used in and out of the classroom to be a supporting reflection and communication medium between learners, peers and instructor. The practical assessment in the MSTP was mostly conducted on the project-based part, where the instructions imitated the practical training that had been practised in the module, but with additional reflective questions. Thus, learners who performed well during practice may not have experienced problems during the assessment. Therefore, I shortlisted the learning theories that might suit the project-based learning approach to be the fundamental elements of creating the E-portfolio process activities. The theories are Competency-Based Training (CBT) by McCowan (1998), Discovery learning (Bruner, 1961) and Kolb's Experiential Learning (KEL) theory by Kolb (1984).

CBT draws heavily and directly from six concepts: operant conditioning, minimum competency testing, instructional design, objectives-based instruction, mastery-based learning, and criterion-referenced testing. These concepts are influenced by three paradigms: behaviourism, scientific management and progressive education (McCowan, 1998). In the MSTP, current pedagogy had adopted these criteria, such as each learner needed to master and gain competency in an earlier module in order to move to the next module. The process of mastery includes features like learning by chunks, a small number of tests, each test encompasing objectives-based instruction, and each test evaluating three domains: cognitive/knowledge, psychomotor/performance and affective/attitude (Leong et al., 2009). However, there were clashes of views concerning whether either MSTP should be influenced by behaviourism or constructivism. The traditional MSTP placed the emphasis on learners to learn by imitating the teacher, the timing was set and determined, and a fully teacher-centred approach was applied. As the learning process evolved, the concept of behaviourism also evolved where learners are encouraged to learn at their own pace and construct their own knowledge and skill until they achieve the target and learning satisfaction (Leong et al., 2009). However, as long as the institutions follow and run the structures and curricula that have been set and approved by the ministry, these paradigms should not impact the teaching and learning process. Thus, due to the importance of the CBT concept to the training curricula in the MSTP, the features in this concept must be taken into consideration when developing the E-portfolio process activities.

The next theory, Bruner's concept of discovery learning, is an inquiry-based, constructivist learning theory that takes place in problem-solving situations where the learner draws on his/her own past experience and existing knowledge to discover facts and relationships and new truths to be learned (McLeod, 2008). Bruner (1961) suggested that learners' build their own knowledge by organising and categorising information using a coding system. He believed that the most effective way to develop the coding system is to discover it rather than being told it by the teacher. The concept of **discovery learning** implies that students construct their own knowledge for themselves. Students interact with the world by exploring and manipulating objects, struggling with questions and arguments, or performing experiments. As a result, students may be more likely to remember concepts and knowledge discovered on their own. Models that are based upon the discovery learning model include: guided discovery, problem-based learning, simulation-based learning, case-based learning, and incidental learning, among others (Bruner, 1996).

In quite a similar manner, in the KEL theory, David A. Kolb, who was the person influenced by this theory believes: "*learning is the process whereby knowledge is created through the transformation of experience*" (Kolb, 1984, p.38). The theory presents a cyclical model of learning consisting of four stages: *concrete experience (or 'Do'), reflective observation (or 'Observe'), abstract conceptualisation (or 'Think)* and a*ctive experimentation (or 'Plan').* One may begin at any stage, but the stages must follow each other in the given sequence. Kolb's four-stages learning cycle shows how experience is translated through reflection into concepts, which in turn are used as guides for active experimentation and the choice of new experiences (Ruble, 1978). The first stage, *concrete experience*, is where the learner actively experiences an activity such as a lab session or fieldwork. The second stage, *reflective observation*, is where the learner consciously reflects on that experience. The third stage, *abstract conceptualisation*, is where the learner attempts to conceptualise a theory or model of what is observed. Finally, the fourth stage, *active experimentation*, is where the learner plans the next learning activities based on knowledge that has been gathered through the previous stages. In this theory, terms like social communication, reflection, learner's motivation and the development of knowledge are used in all four of the cyclical stages, where these features are applicable and vital to be explored in the practice (Buzzetto-more & Alade, 2008).

Both Bruner's discovery learning theory and KEL theory are suitable for the nature of MSTP pedagogy. However, Bruner's theory is too broad and encompasses many models where further comparison needs to be identified to match both the E-portfolio activities and the MSTP training structures. In contrast, the KEL seems promising and robust enough to be adopted along with the existing MSTP pedagogy and the E-portfolio application. Therefore, I conducted further research into past studies that had adopted the KEL concept in their E-portfolio development and implementation. These comparisons are elaborated upon in the next section.

2.6   Learning theories adopted in the E-portfolio processes

The significance of this study is situated in the use of E-portfolios where the activities and processes have adopted both KEL theory and CBT concept in accordance with the structure of the MSTP. The E-portfolio process is an important feature of the E-portfolio implementation due to its functions in stimulating learners to operate the application according to the activities' instructions and to guide learners in every step of use so the objective of the use can be achievable. The process needs to be developed by considering the learners' capability, as suggested by Ayala (2006). He suggested two steps in order to make the E-portfolio more student-centred, which are, firstly, to carefully design the process to be slower so the slowing down will enable more users to be involved in the process, not just the enthusiasts. Secondly, the E-portfolio process should favour students' needs and concerns, so they will keep being motivated to accomplish the mission right up to the end. Furthermore, the E-portfolio process should be designed and developed to be meaningful to learners. The process must be comprehensible to the users so the aims and objectives of the E-portfolio deployment can be met. This is supported by Nor et al. (2012) who argue that the E-portfolio process has faced issues due to the users' failure to give meaning to the process, thus distracting from the construction of anticipated knowledge and skills that is the aim at the end of the process. Thus, each process must clearly state its objectives and target to be attained along with the procedures and supplementary requirements. The CBT and KEL theories provide guidelines to outline the features that need to be put into practice in order to provide a working E-portfolio application in the MSTP.

KEL and CBT concepts were adopted in the E-portfolio process in order to design the activities involved so that the important criteria for the MSTP learning environment could be embedded in the execution process. Coffield et al.(2004) mentioned in their summary of learning styles that every institution or education provider is free to choose a suitable pedagogy or learning style as long as it can help to improve the knowledge and skills delivery and is supported by the available resources around them. The combination of theory, pedagogy or learning style can help teachers be more creative and extend their understanding of the learning styles of the students. In this research, the KEL model was adopted where the four phases in a cycle were adapted to suit the program structure in the MSTP. The characteristics of KEL such as experiential learning, teamwork, communication skills and learning responsibility were merged together with the important criteria of CBT such as progress-based learning, the hierarchical structure of learning and learning reflection. Through using the E-portfolio, these two theories were brought together and became guidelines to plan, execute and evaluate the effectiveness of the E-portfolio activities. Further explanation on the E-portflio process is presented in Chapter 3, 3.2.3.1.

2.6.1 Influences of Kolb's model of Experiential learning in the MSTP

According to Kolb (1984), learning is "*the process whereby knowledge is created through the transformation of experience where the knowledge will result from the combination of grasping and transforming experience*" (p. 41). KEL theory provides a framework for designing active, collaborative, and interactive learning experiences that support this transformational process (Bolan, 2003; Kolb, 1984). Experiential learning is a holistic process that has experience as its foundation and stimulus, and it actively involves students in constructing their experiences within the socio-cultural context (Boud, Cohen, & Walker, 1993). Through original design which builds upon the work and influence of Dewey, Lewin and Piaget (Nielsen-Englyst, 2003), Kolb conceptualises learning from experience in terms of four components, each of which requires learners to invoke specific abilities: concrete experience draws on the learner's willingness to experience new things; reflective observation requires an ability to consider experiences from a variety of perspectives in order to find meaning; abstract conceptualisation requires an ability to analyse and integrate new ideas and concepts,

drawing logical conclusions through reflective consideration of new experiences; and active experimentation requires learners to apply new learning to practice, problem solving, and decision making, which leads to new concrete experiences (Merriam, Caffarella, & Baumgartner, 2007). These abilities are integrated into phases of a cyclical process referred to as the experiential learning cycle. Within the cycle, each of these four components entails its own distinctive process for the learner (Bolan, 2003; Kolb, 1984; Svinicki & N.M.Dixon, 1987), as illustrated in Table 2.4:

1. Experiencing (concrete experience): the learner begins with an experience of a concept or situation.

2. Examining (reflective observation): the learner considers and examines the new experience from a variety of perspectives in order to find meaning.

3. Explaining (abstract conceptualisation): the learner looks for patterns, builds concepts, and tests theories, considering what was learned and drawing logical conclusions about its future implications.

4. Applying (active experimentation): the learner draws upon previous insights to make decisions and apply concepts to new concrete experiences.
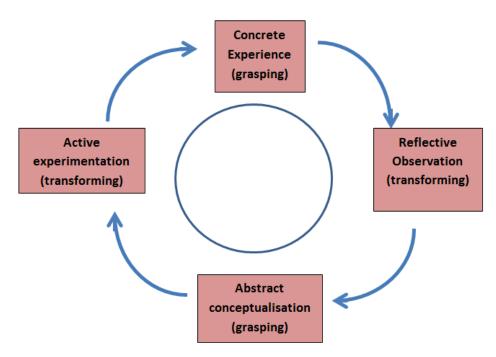
Figure 2.4 The Four components of the Experiential Learning Cycle (Kolb, 1984)

In Malaysian skills training pedagogy, the applicable method is more focused on gaining experience by performing tasks during practical training rather than just attending theoretical lessons. This is evidenced by the structure of the Malaysian Skills Training Certification that has been published for institutions' reference, as illustrated in Figure 2.5. Learners on the MSTP have to undertake 60-80% of practical activities during the training course and only 20-40% of lectures in the classroom(DSD, 2007b).

Practical training in the MSTP means the student has to engage with 'hands-on' performance or action according to an instructional design set (Abd Aziz & Haron, 2012; Dollah et al., 2012; Zulkefli et al., 2012). This indicates that a student needs to experience how to perform a task by adapting prior theories and knowledge learned in order to achieve a specified result. Through this method, new knowledge will be generated as an outcome of a combination of the practical and previous knowledge. This could lead to students being helped to construct *'...knowledge through experiential, contextual, and social methods in real-world environments'* (Lynch, 1997, p27) which, according to Lynch, is the purpose of vocational/professional education. This is supported by Ahmad, et al., (2008) who mentioned the issues and challenges in the Vocational and Training School in Malaysia; this programme attempts to make use of real work experience to enable the transfer of specific learning to generalised contexts and competencies, and to place them in a broader educational framework. The MSTP currently applies Instructional Design in each course which refers to NOSS during the development of syllabus and course materials. These instructional designs support both knowledge and practical activities during training (DSD, 2007a), which outline the experiences and knowledge that are expected to be gained after each activity.
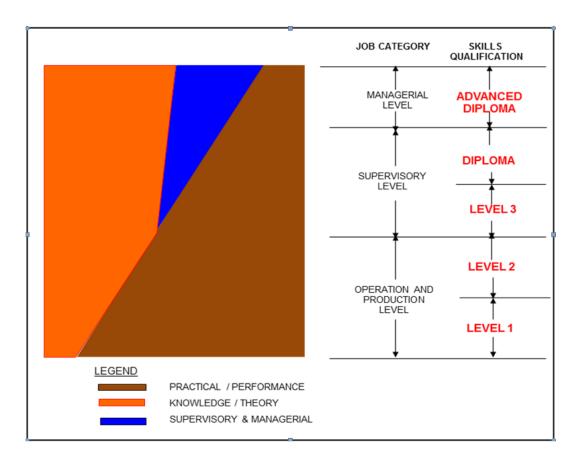
Figure 2.5 The Structure of MSTP (DSD, 2007, p. 20)

Describing how KEL model, in particular, can be used in instructional design, Svinicki & Dixon (1987) suggested that certain commonly used teaching and instructional activities can support different phases of the cycle. They provide the following examples:

1. To foster concrete experience, instructors can employ readings, examples, workshop or laboratories.
2. To foster reflective observation, instructors can assign journals, discussions, and brainstorming activities.
3. To foster abstract conceptualisation, instructors can provide model-building activities, assign papers, or deliver specialised lectures.
4. To foster active experimentation, instructors can incorporate simulations, case studies, fieldwork, or final projects.

In this way, KEL model provides a functional framework for selecting and sequencing learning activities that support students as they learn from experience while working on a context-rich, real-world project.

Previous studies have proven that an E-portfolio adopting KEL model of experiential learning in the process of use could help learners to demonstrate the learning outcome in a more structural and organized way. Moreover, the findings of several researchers that adopted this theory in their projects, potentially supports collaborative learning and professional development, could promote creative learning as well as improving technical skills, indicate that the E-portfolio has been accepted in both institutional education and in the workplace (Brown, 2009, 2011; Kocoglu, 2008; May, Terkowskyl, Haertep, & Pleul, 2012). Although there were some issues, such as lack of training (Kocoglu, 2008) and deficiency of learners' commitments and skills (Brown, 2011), the E-portfolio deployment which adopted KELseems to be working and has achieved a significant impact on most of the studies. Table 2.6 summarises the previous studies that adopted KELtheory in their E-portfolio research process and my observation of those researches.

Table 2.6: Summary of literature review comparing E-portfolio projects based on Experiential Learning from 2008-2013

	Researcher	Title/Scope	Issue	Theories/Concepts/ Methods	Findings/Discussion	My observation
1.	Dunlap, Dobrovolny, & Young (2008)	Preparing E-learning designers using KEL.	A proper instructional design model needs to be developed in order to guide students in completing the assigned project.	KEL model was adopted in the process of completing each phase of the project. The project was to prepare students to work as E-learning designers and specialists. Thus, the students may use this model in their E-portfolio in order to accomplish the project objective.	KEL model has assisted them to select and sequence suitable instructional activities to create an E-learning experience that efficiently engages students in the learning process and leads to a high level of student satisfaction.	This paper was my primacy reference in order to design the E-portfolio process that adopted KELtheory.
2.	Kocoglu (2008)	An investigation of Turkish EFL student teachers' perceptions of the role of E-portfolio in their professional development.	The E-portfolio should enhance reflective thinking and promote the professional development of a student teacher.	The qualitative method, which is interviews, was conducted pre and post the deployment of the E-portfolio. KEL model was adopted in the process of deploying the E-portfolio to promote reflection and professional development of student teachers.	It was believed that the E-portfolio could help student teachers keep abreast of innovations in the digital world. It was also perceived as a 'fancy tool' to assist them in their search for a job and a tool to preserve a collection of materials that showed their best work. The experiences in using this application opened up an opportunity to work collaboratively, which in turn supports their ongoing professional development. However, the student teachers	The findings mentioned that the E-portfolio seems acceptable as a medium for best work compilation and for preparation in job hunting. However, they reported that it has not been so effective in supporting the reflective thinking process. It might be that the process of practice may not be implemented correctly

					raised concerns as to whether electronic portfolios can be an important tool to develop reflective thinking. They still believed that a paper-based portfolio provided much more helpful support for reflection during learning. Furthermore, the student teachers need to be trained sufficiently in technology use in order for the use of IT during teaching and learning to be enhanced.	or that the activities included did not adequately provide space for reflective thinking. Issues such as support and training must be taken into consideration. Activities also needs to be developed for my study in order to promote reflection.
3.	Brown (2009)	Experiential learning E-portfolios: Promoting connections between academic and workplace learning utilising information and communication technologies	An experiential or career-based E-portfolio should be developed and used to connect learning in educational institutions to that of the workplace in order to match and articulate skills and knowledge gained between them.	Two case studies of E-portfolio pilot programs were implemented. Surveys and focus group discussion were conducted to obtain the data after the programs' implementation.	In the case of the implementation of the experiential learning E-portfolio, the utilisation of photos, videos, hyperlinks and other information and communication technologies has the potential to present a different dynamic to the process of assessing workplace learning. The use of ICT to present reflection seems to have increased the learners' technical skills, thus demonstrating learning in a high tech format.	The outcome showed that ICT could contribute to increase learner's knowledge and technical skills. This has been widely mentioned in the previous E-portfolio research. However, the main point here is when intending to adopt the experiential learning approach, the utilisation of photos,videos and links should be taken into consideration for the process activities to be developed.

| 4. | Brown (2011) | The use of an Experiential learning E-portfolio to be used for Prior Learning Assessment and Recognition (PLAR) | The author contends that this type of PLAR enables undergraduate adult learners to not only articulate and equate experiential learning to academic knowledge, but also, and most importantly, to demonstrate knowledge visually and audibly through the utilisation of ICTs. | Two pilot case studies of E-portfolio development are described to support the author's position. Pre and post surveys were conducted to collect the data of the study. | The development of this experiential learning E-portfolio has impacted learners' technical skills while increasing academic competencies and does support assessment of professional/workplace learning. However, it was also found that the E-portfolio development process has compounded their academic workload, where learning how to transform a paper portfolio into an e-format proved challenging and time consuming. | This study was a follow-up to the 2009 study, but implemented for a different target and purpose.

Even though the result showed significant accomplishment, the challenges and issues raised have to be taken into account in order to pursue KEL model for my study. |
|---|---|---|---|---|---|---|
| 5. | May, Terkowskyl, Haertep, & Pleul (2012) | Using E-portfolios to support experiential learning and open the use of tele-operated laboratories for mobile devices | The concept of Experiential learning is proposed to be used in practice to sequence the E-portfolio process. The study aims to explain why and how the E-portfolio could be used as a co-tool during the laboratory sessions for engineering students. | This is a working paper, thus the methods used investigated the current learning process situation and reviews of past literature that support this study. | The integration of experiential learning and the use of E-portfolios was believed to offer a great potential to promote the learners' creativity. These portfolios provide a good opportunity to document the experiments for personal use or for evaluation by an instructor. By looking at the portfolios, the instructor can see both what kind of experiments the students have performed and what they have learned from them. | This paper inspired me to design E-portfolio process that adopted KEL in practice. This paper has shown an acceptable justification for why the integration of E-portfolio and practical experiments in laboratories could lead to improvement of learners' creativity and enhance their comprehension of the subject. |

However, there are issues raised related to this KEL model. For example, Tennant (1997) argued that this model does not suit a multi-cultural environment, and perhaps it should be designed to consider differences in cognitive and communication style which vary based on geography, language, lifestyle and learning condition. This relates to Jarvis's (1995) opinion where he points out that the experiential learning model does not apply to all situations. He claims that, in certain learning situations, there are alternatives such as information assimilation phase or memorisation stage instead of just four stages of activities.

Nonetheless, as Tennant (1997) points out, the KEL model provides an excellent framework for developing teaching and learning activities as well as for the vocational and training programme; therefore, this research adopts the concept of the model for E-portfolio process activities designed for Skills Training courses. This coincides with Skills Training pedagogy that combines knowledge and experience to produce competent trainees for the working environment.

The activities that incorporate KEL model in the E-portfolio process are further elaborated in Chapter 3.

2.7   E-portfolio in MSTP : Why an E-portfolio?

The MSTP, which is a sub-programme under TVET, currently deploys a file-based portfolio encompassing trainees' paper-based competencies and evidence. This evidence could include reports, project papers, assignments or assessment sheets. Therefore, to introduce the electronic-based portfolio is sensible in order to empower these trainees with IT skills. The MSTP qualification framework states that the MSTP should:

  i.   Provide an alternative and equally attractive career development path parallel to the academic-based certification;

  ii.   Promote lifelong learning and upward mobility for skilled workers, especially those who are already in business;

  iii.   Produce highly competent, highly qualified and highly skilled workers;

  iv.   Add value to the existing vocational and academic programmes so that graduates are more marketable;

    v.   Provide a common platform for trainees for both public and privately run programmes to obtain the same standard of qualification;

    vi.   Enhance the corporate image of training institutions; and

    vii.   Enhance the status of skilled workers in the country.

Consequently, Van Merrienboer, Clark, & De Croock (2002) postulate three aspects of CBT-based education that may play a major role in the near future. Those are:

    i.   The design of learning tasks is at the heart of competency-based learning or a competency-based curriculum;

    ii.   Learning tasks will be performed more and more in technology-enhanced environments, and;

    iii.   Testing and assessment of competencies will become important, asking for new approaches to diagnosing learner progress.

Therefore, the potential benefits offered by the E-portfolio application could meet the requirements stated above and that have been mentioned earlier in the literature. Thus, the rationale behind the study can be explained as follows:

1. To enhance the quality of the MSTP for future sustainability as mentioned by Minghat & Yasin (2010) in their research on developing a sustainable framework for Technical and Vocational Education in Malaysia, ICT skills are one of the important features that contribute to the framework. In addition the MSTP should enhance the structures of the programme so the learning will be more technology-friendly, the E-portfolio could contribute to providing a new learning environment as well as new approaches by which to monitor learner progress and accomplishment of assessment.

2. To upgrade the knowledge and skills of MSTP trainees and trainers to become IT-savvy, in line with the future mission of the Department of Skills Development (DSD) to produce a more multi-skilled workforce, thus improving graduate marketability for the industries (Ahmad, 2015).

3. To improve the public perception of the MSTP as stated in the MSTP framework that a corporate image of the training provider should be enhanced in order to attract the public to participate in the programme.

Through the E-portfolio application, institutions can promote themselves as high-tech institutions that keep abreast with the growing ICT technology.

2.7.1 The E-portfolio Key Indicators

Recent research into E-portfolio implementation in the MSTP has been carried out by the University of Tun Husseion Onn, Malaysia (UTHM). However, the research has currently yielded only the indicators of an acceptable E-portfolio to be applied in the MSTP sector (Rahim, 2015). No research on the implementation of an E-portfolio in real -practice has been reported and published at the time of writing this theses (as of August 2015). This research takes these indicators as a validating tool and as a checklist at the end of my study. As my project commenced in early 2013, when these indicators had not yet been discovered, I had to anticipate that some of the features might not be satisfied by my study. Thus, I put these indicators in the literature review chapter due to its relevance as my reference and motivation. Table 2.7 lists the indicators of an acceptable E-portfolio as produced by Rahim (2015).

Table 2.7 The 22 key indicators (features) of an anticipated E-portfolio for competency assessment in the MSTP (Rahim, 2015)

No	Key Indicator
1	Editing Information
2	Collecting learning material
3	Presenting information in various ways
4	Posting homework
5	Guiding students
6	Online monitoring
7	Detection of the learning process
8	Posting practical work
9	Online discussion activities

10	Test in the form of multiple-choice answers
11	Test in the form of short essay
12	Overall score testing
13	Formative test
14	Summative tests
15	Comments by teacher
16	Assessment verification
17	Space for sharing ideas
18	Space for sending message
19	Space for reflection
20	Space for communication between the students and their classmates
21	Space for communication between teachers and students
22	Space for communication between the students and students from other classes.

2.8   The Open Source E-portfolio Software – MAHARA

Mahara is one of the E-portfolio software packages available on the market which has become preferred by institutions due to its cost-efficient open source application (M. Brown, Anderson, Simpson, & Suddaby, 2007). It is a fully featured web application where users can create journals, upload files, embed social media resources from the web and work together with other users in groups. First established in mid-2006, the Mahara project started as a cooperative venture funded by New Zealand's Tertiary Education Commission's E-learning Collaborative Development Fund (eCDF), involving Massey University, Auckland University of Technology, The Open Polytechnic of New Zealand, and Victoria University of Wellington (Mahara, 2006).

I chose MAHARA out of several software packages due to its customisable and flexible features. It is a complete personal learning environment mixed with social

networking, allowing users to collect, reflect on and share their achievements and development online in a space they control. Mahara is built on open source and open principles, so there is not much cost involved in buying the application licence. In addition, based on research on evaluation of E-portfolio software by Himpsl & Baumgartner (2009), MAHARA is the most balanced product, which can be used for portfolio work without huge time expenditure for installation. Furthermore, it is also convenient to be used to collect, organise and select artefacts for compilation. It also offers features and functions for reflecting, communicating, planning and publishing work online. Table 2.8 below illustrates the features of a few types of E-portfolio software available in the market as at May 2008. It can be seen that MAHARA is listed as E-portfolio management software under the 'Open source' licence type with several advantages like it supports the reporting and publishing features and allows functions on collecting, organizing and selecting user artefacts

A great deal of research and projects on executing an E-portfolio in institutions from primary schools to higher education have chosen MAHARA to be the application software to assist the learning process (Gerbic et al., 2009; Giannandrea & Sansoni, 2011; Hilzensauer & Buchberger, 2009; Kubota & Matsuba, 2013; Queirós et al., 2011; Tanaka & Sawazaki, 2013), as well as to serve for lifelong learning and career preparation (Presant, 2011). Some of the research has reported that this application is easy to set up and introduce to the user; thus, its flexibility and stability make practitioners committed to the continued use of the system.

Table 2.8 The evaluation of E-portfolio software (Source: Himpsl & Baumgartner (2009))

Evaluation of E-Portfolio Software Overview (May 2008) Product	Type	Licence	Effort for first time installation	Collecting Organizing Selecting	Reflecting, Testing, Verifying Planning	Representing Publishing	Administration	Usability
Drupal ED	I	OS	✔	✔✔✔	✔	✔✔	✔✔✔	✔✔✔
Elgg	A	OS	✔✔	✔✔✔	✔	✔✔	✔✔✔	✔✔✔
Epsilen	M	PU	✔✔✔	✔	✔✔	✔	✔	✔
Exabis	L	OS	✔✔✔	✔	✔	✔	✔✔✔	✔✔
Factline	I	P	✔✔	✔✔✔	✔	✔✔✔	✔	✔
Fronter	L, I	U	✔✔	✔✔✔	✔✔	✔	✔✔	✔
Mahara	M	OS	✔✔✔	✔✔✔	✔✔	✔✔✔	✔✔	✔✔
Movable Type	I	OS	✔	✔✔✔	✔	✔✔	✔✔✔	✔✔
PebblePad	M	PU	✔✔✔	✔✔✔	✔✔	✔✔✔	✔✔	✔✔
Sakai	L, I	OS	✔✔	✔✔	✔	✔✔✔	✔✔✔	✔✔
Taskstream	M, I	PU	✔✔	✔✔	✔✔✔	✔✔✔	✔	✔✔
Wordpress	A	OS	✔✔	✔✔✔	✔	✔✔	✔✔	✔✔✔

Legend:

Type		Licence	
I	An integrated systems that included features like content management system with rather "indirectly" possible Portfolio functions	OS	Open-source
A	Other systems, respectively kinds of software	P	Commercial with all-inclusive offer
M	E-portfolio-Management-Software (products deliberately offered to institutions as E-portfolio software)	U	Commercial with licenses per user
L	Learning Management System (LMS) with integrated E-portfolio functions ("learning platform" with E-portfolio elements)	PU	Commercial with a combination of P and U

2.9 The research aims and objectives

After reviewing the literature, I have found the resources as well as the motivation to strengthen the rationale for developing and pursuing this research. Thus, this research intends to develop an E-portfolio application using MAHARA software to be utilised by students and instructors of the Malaysian Skills Training Programme (MSTP) in one accredited centre and to research the system's use in order to see its effectiveness and its impact on the MSTP. In addition, this research also aims to investigate the E-portfolio engagement of students from different skills training courses in relation to the learning theories that have been designed for the process of the E-portfolio activities.

In order to achieve the aims of this study, a main research question has been formulated as follows:

"To what extent can an E-portfolio Application perform as an effective learning tool in the Malaysian Skills Training Programme (MSTP)?"

In order to achieve this main research question, the study will address the following sub-questions:

1. What is the potential of the E-portfolio application to be implemented in the MSTP?
2. What are the benefits and limitations of implementing the E-portfolio application in the MSTP?
3. What are the key factors to achieve a successful E-portfolio implementation in the future?

2.10 Conclusion

This chapter has reviewed the literature relating to education in Malaysia, online learning applications, E-portfolio applications and the learning theories that underpin this research. Motivated an d inspired by these sources, I have set the research aim and objectives to be attained and explained at the end of the study. It is hoped that this study will give new insight into the MSTP learning structure and

provide a new beginning in the effort of introducing the E-learning application in the programme. The next chapter will explain the E-portfolio development process and the process designed to suit the nature of the MSTP learning structure.

CHAPTER 3

THE E-PORTFOLIO DEVELOPMENT PROCESS

3.1   Introduction

This chapter is created specifically to explain the E-portfolio development process. There are five features that have been adapted from the previous research to become guidelines for this development. Each of the features is thoroughly described in this chapter. This development process is important to ensure that the designed E-portfolio project is on the right track and that there is a clear path and mission throughout the project duration.

3.2   The E-portfolio Development

The E-portfolio development plan adopted the five 'Threshold concepts' that were presented by Joyes & Smallwood (2012) in their study on implementing an E-portfolio in 18 institutions in the UK, Australia and New Zealand. The five threshold concepts are as follows:

- The purpose needs to be aligned to the context to make best use of the benefits: some contexts suit some purposes more than others and analysis of the benefits (and costs) of the purpose in the particular context will determine how far alignment exists;

- Learning activity needs to be designed to suit the purpose: there must be conscious design and support of a learning activity/activities suited to the purpose and the context;

- Processes need to be supported technologically and pedagogically: the processes involved in the creation of the E-portfolio in the particular context must be understood, and technical and pedagogic support need to be provided in tandem;

- Ownership needs to be student centred: the E-portfolio processes and outcomes need to be owned and their visibility determined by the student;

- Transformation (disruption) is planned for: E-portfolios are potentially transformative and as a result can be disrupted from a pedagogic, technological and institutional perspective, because they tend not to fit exactly within existing systems.

Figure 3.1 illustrates the E-portfolio development process for this research that have been adopted from the 'Treshold concepts' as elaborated above.

PURPOSE

The E-portfolio was designed to suit the purpose as a medium of assessment blended with the conventional method. Additionally, it has been promoted as a Showcase Portfolio to whomever is interested.

LEARNING ACTIVITIES

- Based on existing Skills Training Pedagogy.
- The E-portfolio is deployed for assessment along with the existing assessment method.

E-portfolio Development Process

PLANNED TRANSFORMATION

The plans executed were related to user's assistance, such as peer-mentoring and improved manual of use.

OWNERSHIP

Owned by students individually, even though the assignment may consist of a group task. User can set the privacy level and limit access to content.

E-PORTFOLIO PROCESS

The process adopted the Kolb's Experiential Learning theory and Competency-Based training concepts, which emphasise features like reflection, knowledge and skills development, progress-based learning, social and private communication and instructor engagement.
Software used was MAHARA (open source).

Figure 3.1 The E-portfolio Development Process

3.2.1 Purpose

The E-portfolio's purpose was set at the beginning of the project: to become an assessment medium that was blended with the existing method. This decision was motivated by the feedback and responses gathered from the early study. Most of the respondents, who were government officers, principals and instructors supported the introduction of the E-portfolio as a medium for assessment.

To attain this purpose, the students were expected to submit the reports based on the practical work performed. Submission of the reports needed to be staggered according to the progress plan that had been set by the instructor. Apart from that, the students were also expected to participate in the forum discussion, feedback and comments as well as to produce a showcase collection of achievement in their E-portfolio.

To see the differences between the current pedagogy that is not using E-portfolio during training with the E-portfolio blended mode, Table 3.1 illustrates the learning process in both situation.

Table 3.1 The differences between current pedagogy (without E-portfolio) and E-portfolio blended mode

Learning Process	Current Pedagogy	E-portfolio blended learning
Theoretical lesson	In class lesson	Student discussed topic in the forum
Practical lesson	Hand-on activities based on theoretical lesson (in lab or workshop) Submission of practical report for grading (paper-based)	Hand-on activities based on theoretical lesson (in lab or workshop) Submission of practical report by stages (2 progress stages and

		1 final report) through E-portoflio account. Feedback and comments were annotated during the 2 progress stages.
Theoretical Assessment	Done in paper based. This paper was then been inserted in a file portfolio	No activity involved in E-portfolio.
Practical Assessment	Hand-on assessment (in lab or workshop) Submission of practical report for grading (paper-based)	Hand-on assessment (in lab or workshop) Submission of practical report by stages (2 progress stages and 1 final report) through E-portoflio account
Summary	All paper-based report and assessment paper were compiled in files called Personal Portfolio. This portfolio were verified by the external verifier appointed by the ministry before the student attains the award.	The student still owned a file portfolio that contains the theoretical assessment and practictal sheets/instruction. But the evidences/report produced for the practical session were kept in their E-portfolio account. The verifier could review their E-portfolio account and verify the evidences..

3.2.2 Learning Activity

This project was implemented with the students of Level 3 and Level 4 (Diploma) in the Malaysian Skills Training Programme (MSTP) at the selected accredited Skills Training Institute that had been verified by the Ministry. In 2013, three groups – Level 3 students on computer systems (CS) and dressmaking (FES) and Level 4 students on Kitchen Practice (KP) courses – deployed the E-portfolio in a one-semester training of 6-7 months; while, in 2014, there was another cohort of students from Level 3 studying CS, FES, Electrical Wireman (ELC) and Plantation (LDG) studies.

The E-portfolio was mainly expected to be part of the performance assessment process, where students have to submit a project report based on their practical work during a training session into their respective E-portfolio accounts. The project-based assessment is one of the assessment methods approved by the awarding body (DSD, 2007b). As part of the CBT project requirements for Skills Training Courses, students must complete a range of real-world activities based on conventional instructional design phases and processes. The practical task in the respective modules included the following steps, which were broken down into specific projects:

1. Describe the instructional problem to be solved.
2. Conduct a front-end analysis, including needs/opportunity assessment, audience analysis, and environment analysis.
3. Establish learning goals, objectives, and outcomes, and determine appropriate development methods.
4. Develop a project proposal that includes descriptions of appropriate learning and training activities.
5. Create a logical prototype, including diagram, image, layout and all related features.
6. Develop an action plan outlining next steps, further development needs, appropriate technologies and tools, lessons learned, and future learning goals.

Students were assigned to a project in teams, which provided technical support, initial feedback, and encouragement to their members. Research has found that, without significant support and structure, students may find working on real-world projects frustrating, ineffective, and demoralising (Kirschner, Sweller, & Clark, 2006). To pre-empt this challenge, KEL model was used to structure and sequence the students' work on their real-world projects so that student frustration and the effects of transactional distance were minimised.

In between the project implementation, three milestones comprising two progress milestones and one final submission were observed though individual students' E-portfolio accounts. The E-portfolio features the PLAN function, which has been used to schedule the milestones and become a reminder to both student and instructor. Upon submission, the students' work was evaluated by the instructor through the evaluation rubrics and the final assessment checklist sheets. To observe the system usage, an online monitoring including personal communication between researcher and instructors as well as the students took place accordingly.

Apart from the main purpose of E-portfolio, to become a medium of assessment, this application also featured functions like messaging, forum and feedback space. Thus, the students and instructors were encouraged to actively participate in those facilities, especially in the forum and feedback comments. In addition, during the respective semesters, students were encouraged to include any work from the assessment modules or any product/outcome produced during training itself in the Showcase folder. This activity is not included in the assessment scores but provided impetus for them to showcase their abilities and achievements to the public, especially parents, friends or prospective employers.

More details on learning activities involved in the E-portfolio implementation are described in the next section on E-portfolio processes.

3.2.3 E-portfolio Processes

As has been highlighted in the literature review, E-portfolios can have complex process commands, causing the user to find it hard to implement the system as expected (Nor et al., 2012). Therefore, in this study, the E-portfolio process has been consolidated with the learning theories that relate to the nature of the skills training, which are KEL theory and CBT approach that have been adopted by the MSTP.

3.2.3.1 The E-portfolio process adopting KEL and CBT theories

Because instructional design and progress evaluation are the key activities in CBT and because students have to complete the activities in an authentic manner, there should be a way to scaffold performance. To this end, KEL model is adopted to identify the types and sequencing of activities in order to support students as they engage in authentic instructional design processes. To design the specific activities of the technical E-portfolio project for the practical task, the work of Dixon (1987) on linking of specific teaching and instructional activities to the four phases of KEL cycle was consulted. To scaffold students' performance as they engaged in instructional design activities during training sessions and E-portfolio sessions, each activity was designed generally to include the four phases of KEL cycle so that students would engage in a continual cycle of experiencing, examining, explaining, and applying. These phases include the activities of training and E-portfolio engagement.

In their research on development of a pentagonal E-portfolio model, Buzzetto-more & Alade (2008) presented one of the pedagogic benefits of the E-portfolio as experiential learning, where students 'learn by doing' rather than learn through telling. The involvement of students and instructors, and the support of an E-portfolio process that adopts the social and experiential aspects of learning can help the training environment become more sustainable. The relation of practical design in CBT and KEL design in the E-portfolio process will create a learning experience as this experience is really necessary for student competence and performance (Batson, 2011).

Figure 3.2 illustrates the deployment flowchart for both roles (student and instructor). Students had to create an account, participate in the forum or discussion, develop a 'page' in their account and create functions like a PLAN checklist and personal profile. Then, the pages were viewed and commented on by the instructor through feedback spaces. Further communication happened here in order to achieve a satisfactory final outcome. On the other side, the instructor initiated the process of deployment by conducting training guided by the manual and resources supplied. Then, the instructor moderated the Forum topics and instructed the students to explore the other required functions as a process by which to accomplish the assessment. The instructor plays an important role in ensuring the continuity of this system. Therefore, it is essential to keep the instructor's motivation high so that they can deliver the information and moderate the use as desired.
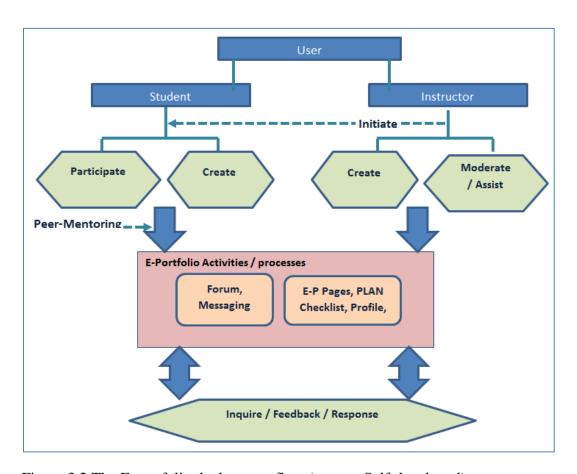
Figure 3.2 The E-portfolio deployment flow (source: Self-developed)

The E-portfolio process was created by considering the characteristics of two learning theories associated with Skills Training Education. KEL theory, which emphasises the importance of a trainee learning by experience or practical work, inspired the process to include the stipulation of hands-on experience during training (Kolb, 1984). In addition, the process also incorporates features like social communication, learning reflection, construction of knowledge and learning motivation where these features also are important concepts associated with KEL theory (Svinicki & N.M.Dixon, 1987).

The other theory that provided a guideline in creating the E-portfolio process is CBT (McCowan, 1998; Spady, 1977), where the concept influenced most of the process, such as progress-based learning, objectives and hierarchical-based instruction, learning responsibility and the engagement of instructors and peers.

The learning activities that incorporated the E-portfolio were outlined in a complete set of instructions and disseminated to the students during the practical session. The E-portfolio activities were only involved in the practice session as, during this session, students will have their active learning session through the hands-on tasks outlined in the module content. However, early in the module, the instructor may initiate the topics in the E-portfolio using the forum section to induce students to discuss their past knowledge about current topics and share their experiences with others.

Based on KEL theory where he put four activities into the learning process, I adopted the scheme as the main part of the E-portfolio process to be implemented in a module session. Figure 3.3 below illustrates the process of training for one module that encompasses the E-portfolio activities.

The activities commenced with a training session where the students had a lecture, briefing about the current project tasks and executed hands-on practice. The lecture sessions reviewed past projects or brainstormed on students' previous knowledge, while the practical work included preparing the sewing pattern for a ladies' blouse (Ladies' Dressmaking) or demonstrating how to prepare a marinade paste (Kitchen Practice). The E-portfolio activity was initiated with an online discussion inducted by the instructor. A question like: "*List other dishes that can be marinated with the paste*"

or *"Can the blouse pattern be used for a modern kurung [enclosed dress]?"* can trigger the students to find the answers and participate in the forum session.

Training: Class discussion, Onsite experiment, lab works and Task development
E-portfolio: Online discussion, final project submission.

Training: Lecture, Hands-on practical experience (technical parts, reviews of past projects)
E-portfolio: Online forum (optional)

Concrete Experience (grasping)

Active experimentation (transforming)

Reflective Observation (transforming)

Abstract conceptualisation (grasping)

Training: Class discussion, reflection on theoretical knowledge and practical work
E-portfolio: Online discussion, e-P construction (video, image, outcomes)

Training: Class discussion on Proposal and planning
E-portfolio: Online discussion, Proposal and Prototype submission, feedback

Figure 3.3: The E-portfolio process and activities (source: Self-study)

Then, in the reflective observation, students were asked to find samples or exemplars that were likely to match the current project task. This sample would become a reference for them to create a new and innovative project task. The students could reflect on the exemplar and start to think in many ways about how to produce a better product. In the next activity, where students were discussing their proposals for projects in the class, the E-portfolio activity focused on the proposal submission, a reflection of the instructor's comment and also re-submission of an amendment to the proposal.

Finally, in the active experiment session where students had to perform real tasks in the lab, kitchen or workshop (on-site assessment), the E-portfolio activity required them to submit the paperwork concerning the practical assessment after they had completed the

hands-on session. The end product or service accomplished was assessed along with the paperwork where the complete reports were submitted through the individual E-portfolio accounts. To evaluate the effectiveness of the E-portfolio-Module activities, compared with the non-E-portfolio-Module, I disseminated an evaluation sheet called a rubric of assessment to be marked by the instructor of each class. The results of this rubric are explained in Chapter 5, section 5.7. Table 3.2 summarises the combined activities that were implemented during the E-portfolio-Module session.

Table 3.2: Summary of combined activities during training and E-portfolio deployment for one module

Activities in the module	E-portfolio Activities	Participation	Anticipated Student Outcomes
Lecture – The explanation of theories, definition, functions and other related information	- Instructor to initiate topics in the online forum. - Discussion and sharing of information between class members	Instructor & Student	Student reflection through class/online forum participation
Hands-on session – The live presentation demonstrated by the instructor, followed by actual training by the student.	- Students' pages on final product of practical session. - Online discussion in the forum	Instructor & Student	Student reflection through practical exercises and training in workshop/lab (a product/service). *E.g. The production of a sample dress, sample food or sample proposal.*
Assessment (Knowledge Assessment) – The paper-based test		Student	Completed paper-based assessment

Assessment (Practical Assessment) – The project-based assessment	- Students' pages on final product of practical assessment. (Upload the project papers and do the time-plan) - Online discussion in the forum	Student	1. Completed hands-on practical work (product/service). 2. Completed project reports submitted online. The report could be in various forms, e.g. images, PowerPoint presentation or Word document, etc.)

3.2.3.2 Evaluating KEL Model, CBT and Student Engagement in the E-portfolio Process

Using KEL to structure students' online learning activities will also help to attend to critical issues of online student engagement and satisfaction. Alley & Jansak (2001) have identified 10 quality assurance factors that impact student engagement and satisfaction during online learning experiences:

➢ Knowledge is constructed.

➢ Students are responsible for their own learning.

➢ Student motivation is a strong determinant of the outcomes and success of learning.

➢ Higher-order learning activities require reflection.

➢ Learning is unique to the individual.

➢ Experiential, active learning augments the e- learning environment

➢ Learning is both social and private.

➢ Inaccurate prior learning is identified and corrected

➢ Spiral learning provides for revisiting and expanding prior lessons

➢ The instructor is able to guide the overall learning process

The E-portfolio process also involves the characteristics of the CBT, which is the primary basis of the Skills Training Programme in Malaysia. Therefore, several key points illustrated by McCowan (1998) will be included in the design process of the implementation of the E-portfolios, such as:

➢ Clear job descriptions and programme outcomes
➢ Assessments based on job-related competencies
➢ Structured hierarchy of domains, competencies and objectives with Instructional-based process
➢ Minimum competency testing
➢ Process is as important as outcomes.

All fifteen of these factors are addressed by experiential learning and CBT and are reflected in the design decisions for the E-portfolio application process. For example, because students select their own real-world projects, they have responsibility for their own learning and their motivation to learn is enhanced. The individual and group instructional strategies need to be developed for each project activity to put students in the role of actor as opposed to receiver (Svinicki & N.M.Dixon, 1987), encouraging reflection and, subsequently, the knowledge construction and understanding of skills competencies in each process. The effectiveness of KEL model with CBT added that was adopted in the E-portfolio processes was evaluated using the survey questionnaire at the end of each session.

3.2.4 Ownership

As suggested by Joyes & Smallwood (2012), the E-portfolio should be owned by the students themselves in order to give them freedom to create the content at their own pace. This research project also gave full authority to the students to create the E-portfolio at their own pace but within a timeframe that has been outlined in the project duration. Each student has control of their own account and is able to set up the access to the content. They might choose to open up their work to the public or only to their classmates or only to the instructor. These procedures have been explained in the user manual to facilitate their use.

Due to limited storage, the account of students who were successfully graduated will be removed 3 months after they sign up for exit procedures. However, the student were informed and advised to save or export their files to a CD or e-mail. The storage space will be spared for new incoming students.

3.2.5 Transformation Plan

Joyes & Smallwood (2012) mentioned that a transformation plan is like a contingency plan that needs to be prepared in order to cater for any issues that may happen during the system's implementation. This project was executed consecutively in phases starting from the early study, 2013 implementation and, finally, the implementation in 2014. Each of the phases yielded several lessons learned which became guidelines when planning the next phase. Thus, a transformation plan was designed every time the analysis of each phase was completed.

In 2013, the plan was designed to provide assistance through the 'instructor-led deployment' and the user manual that had been supplied with the system. However, the outcome showed that the instructors themselves did not sufficiently cater for the needs of the students with regard to their completion of the project as instructed. Thus, in 2014, a new strategy called peer-mentoring was introduced where some of the students were assigned as a mentor to lead a small group of students (mentees). Enhanced guidelines were also provided, such as a video tutorial, links to several webpages and more exemplars of E-portfolio pages were developed. These strategies have been shown to improve the students motivation to continue to use the system throughout the project duration.

3.3   Conclusion

This chapter has presented the E-portfolio development process that adopted the Joyes et al. (2010)'s five 'Threshold concepts' that have been suggested in the leading E-portfolio research in the UK. These concepts comprised the elaboration of E-portfolio purpose, learning activity, learning process, ownership and the planned transformation. By

following these concepts, the project became more directed and focused to be carried out in practice with the target user. These concepts have also increased my confidence to continue this study due to their suitability to be adopted in the context of the MSTP and because they fit my personal capability to conduct this research.

The next chapter will explain the research methodology that have been deployed within this study. The methodology are comprised of research paradigm, the methodology and methods chosen, the samples, the ethical consideration and, finally, the analysis of data which led to the final outcome.

CHAPTER 4

RESEARCH METHODOLOGY

4.1   Introduction

The research methodology is a way to solve the research problem logically. It may be understood as the science of studying how research is conducted thoroughly (Kothari, 2004). Through it we study the various steps that are generally adopted by a researcher in studying their research problem along with the logic behind them (Kothari, 2012). It is necessary for the researcher to know not only the research methods or techniques but also the methodology. Thus, research methodology is not only about the research methods, but also considers the logic behind the methods that will be used in the context of the respective research study.

Research is motivated therefore by epistemology, ontology, theory, values and practical considerations. Thus, the choice of an appropriate methodology for the current study has taken into consideration the ontological and epistemological norms that support it. In this chapter, I will discuss the three components involved in this study: the research philosophy, the research design and the research methods. Prior to that, the research objectives that are the pillars of this study are also elaborated as, highlighted by Strauss & Corbin (1998), the nature of the research problem is a valid motive for choosing the suitable research methods.

Thus, for every component, the background and justification on how it is relatively connected with the study is also explained. For an overview, this study considers a pragmatic worldview (Cherryholmes, 1992) as my focus is to explore both the phenomena and the empirical data yielded from the evaluation of the E-portfolio application in the Malaysian Skills Training Program (MSTP). The phenomena include feelings, experiences, expressions and suggestions of the users while the empirical data were derived from the scores of the evaluation rubrics and the questionnaires that eventually became the main source by which to answer the research question enveloping this study.

I trusted that mixed methods could promise a great strategy by which to explore and achieve my research objectives as I am inclined towards the pragmatist view that a researcher should have the freedom of choice to determine her/his own way of conducting research (Creswell & Clark, 2011). This research will be strengthened by the characteristics of contemporary mixed methods research, which supports "*methodological eclecticism*": a way of selecting and integrating the most appropriate techniques from myriad qualitative, quantitative and mixed methods so the phenomenon of interest could be thoroughly investigated (Teddlie & Tashakkori, 2010). Hence, the data collection methods incorporated within this study – survey questionnaires, interviews and document reviews – have been deployed to the purposive sampling population of Skills Training trainees and trainers. This parallel mixed methods sampling used the same total sample for both quantitative and qualitative methods in two years of implementation, the 2013 and 2014 cohorts. The justification of all elements in the chosen research design will be explained further in the next section.

In addition, the information regarding ethical approval, the data analysis techniques utilised and the challenges encountered during the process of collecting, analysing and interpreting the data are discussed later in the chapter.

4.2   Research Objectives

The main aim of this research was to evaluate the use of the E-portfolio application by the Malaysian Skills Training students and trainers. The study collected empirical evidence based on the participants' perceptions, by exploring some contingent key factors that may have an impact on the students' performance relating to knowledge, skills and behaviour, as well as semi-structured interview data to unveil their feelings and experience of the application. In order to achieve the aims of this study, a main research question has been formulated as follows:

"To what extent can the E-portfolio Application perform as an effective learning tool in the Malaysian Skills Training Program (MSTP)?"

In order to answer this main research question the study addressed the following sub-questions:

1.   What is the potential of the E-portfolio application to be implemented in the MSTP?
2.   What are the benefits and limitations of implementing the E-portfolio application in the MSTP?
3.   What are the key factors to achieve a successful E-portfolio implementation in the future?

4.3   Research Philosophy

In constructing a research plan, two main questions need to be considered in particular: the methodology and methods that will be engaged with and the justifications of the chosen research design (Crotty, 2003). On the other hand, Creswell (2003) suggested that the researcher should initially prepare larger philosophical ideas to develop a research plan in order to help them justify why they chose a particular research design. Figure 4.1 concludes the process of determining a suitable research design with a few examples listed.

Selected Strategies of Inquiry

Qualitative strategies (e.g., ethnography)
Quantitative strategies (e.g., experiments)
Mixed methods startegies (e.g., sequential)

Philosophical Worldviews

Postpositive
Social construction
Advocacy/participatory
Pragmatic

Research Designs

Qualitative
Quantitative
Mixed methods

Research Methods

Questions
Data collection
Data analysis
Interpretation
Write-up
Validation

Figure 4.1 A Framework for Design – The Interconnections of Worldview, Strategies of Inquiry and Research Methods (Creswell & Clark, 2011)

This section explains the philosophical rationale behind this research, or basically the suppositions that I came to make about the world when conducting this study.

Pragmatism

Pragmatism has many forms of definition depending on the situation and research that is associated with it. Pragmatism is concerned with the application that works to provide solutions to a certain problem. It arises out of events, circumstances and consequences rather than precursor conditions (Crotty, 2003). John Dewey who is one of the influential theorists of pragmatism stated that the pragmatist views the general ideas or particular conceptions resulting from research findings are bases for organizing future observations and experiences, thus these consequences of actions become the vital part (Dewey, 1931). Creswell (2003) also agreed that from the viewpoint of a pragmatist, the truth is one which is generated from consequences. Therefore, pragmatist researchers are free to choose the methods or techniques that meet their needs and purpose without being loyal to any alternative paradigm or methodology. Thus, pragmatism is seen as the paradigm that provides the underlying philosophical framework for mixed methods research (Teddlie &

Tashakkori, 2010) as this method allows the combination of ways or techniques to gather data as long as the objective is being fulfilled.

Another important technique in pragmatist ideology is triangulation. Denzin (1978) defined triangulation as "*the combination of methodology in the study of the same phenomenon*" (p. 291). Denzin stated that it was possible to divide triangulation into four parts: data, theory, investigator and methodology. The researchers are free to integrate those parts as long it is suitable to the research question that is the 'central' power in a study. Therefore, this project will employ data and methodological triangulation.

The differences between pragmatism and the other two common paradigms which have been widely adopted in social science research which are 'Positivism' and 'Constructivism' are illustrated in Table 4.1

Table 4.1 The Differences of Positivism, Constructivism and Pragmatism *(Source: Creswell, 2012)*

Tradition	Positivism	Constructivism/ Interpretivism	Pragmatism
Logic	Deductive	Inductive	Deductive + Inductive
Methods	Quantitative	Qualitative	Mixed (Qual + Quan)
Data representation	Numerical, facts	Textually, Pictorially	Various types (numeric, text, audio, video)
Associated Terms	Survey research, experimental, quasi-experimental, descriptive	Grounded Theory, Ethnography, Case studies	Concurrent (parallel), triangulation, sequential mixed design

This study aimed to discover both the facts and the human experience of using the E-portfolio application during learning. The facts such as the statistical differences of questionnaire scores and assessment marks have indicated if the E-portfolio has impacted

the participants' quality of learning while the interview data on the participants' experience, feeling and attitude after using this system provide a clear picture on how the E-portfolio could change their learning from conventional to E-portfolio blended learning. Therefore, I presumed that the pragmatist ideology does support these approaches in order to achieve the goal of the study. The characteristics encompassed by pragmatism were matched with my mission to accomplish this research objective. For instance, the triangulation technique allows a combination of methods and analysis; hence, data collected in this project were from various forms like interviews, assessment rubrics and surveys.

In short, the three main reasons for me choosing the pragmatist epistemology were firstly because it gives autonomy to the researchers (rather than being prescriptive) about their methods, and so flexibility has been widely attempted and deployed in both my data collection and data analysis stages. Secondly, the paradigm highlights the importance of consequences rather than early presumption, as this study relied on lessons learnt after each stage of investigation to plan and perform further actions. Finally, it offered an opportunity for triangulation for both qualitative and quantitative data, as this strategy might work to provide the best understanding of the research outcomes.

4.4   Research Design

There were few research designs that could have been suitable to be implemented in this research such as action research, case study and experimental or quasi experimental. Action research has various definitions depending on the scope of the research, but broadly it can be defined as a research process that involves collaboration between the researcher and the subjects being studied (Bryman, 2008c). Action research is commonly used in social science such as education, business and management in order to review or improve exisiting practise. In general, action research is suitable if the researcher was closely located near to the research location in order to be able to reflect, evaluate and change current practise based on the findings gathered in a certain phase of the research. However, due to my position as a remote-researcher based in the UK, this method was not suitable. I

was not in a position to actively change my practice because I was far from the research location. My aim was to make a significant contribution to knowledge about the use of E-portfolio in MSTP that could be used to make changes to high level policy, so it was not just about changing my own practice.

The second possible approach is case study. Bryman (2008a) mentioned that research using a case study approach was focused on the particular nature of the case to be studied. The example of a case study approach such as research on a single community about Britons who live in rural Spain or an investigation of a single family that inherits and maintain the family tradition of their ancestors for almost four generations. The key critique of case study research is that it can be hard to generalise the findings beyond the boundaries of a specific case (Stake, 1995). This method would therefore seem to be unsuitable in my research because I would like my findings to be applicable in wide range of courses in MSTP, not only in one or two specific courses. As in MSTP, there were more than 50 courses with up to five levels in each course, and my aim was to get results that are generalizable to different settings.

To consider other options, there are two types of experimental design which are true experimental and quasi-experimental design. However, they have the same purpose which is to investigate the cause of certain phenomenon. In true experiments, all the factors that possibly affect the phenomenon are fully controlled (Creswell & Clark, 2011). If this condition was not practical and not possible, then the quasi-experimental design would take place. In a true experiment, the participants must be randomly selected for either the treatment or the control group. This is different in a quasi-experiment where it is not necessary be randomized. Even though the process of assigning participants could be quite challenging, a true-experiment could give more reliable findings than a quasi-experiment if the selection process was done correctly. In a quasi-experiment, the control and treatment group differ not only in terms of the treatment or intervention they received, but also in other settings such as duration, location and contents.

To implement and evaluate the effectiveness of the E-portfolio system to courses in the MSTP context, I chose to apply the quasi-experimental design which involved the 'with-

E-portfolio test' and 'without-E-portfolio test' in a module. Since participation was from different courses with different numbers of students in each course, I chose a quasi-experimental apporach instead of a true-experiment, where the participants were purposely assigned rather than being randomized. Although this approach was more lenient with regard to the selection of participants, the results might tend to beless validi and reliable if the differences are not controlled properly (Bryman, 2008b). However, to control the differences, the modules evaluated must be equal in terms of their duration and the level of competence which needed to be achieved. To quantitatively measure the comparison, the assessment rubrics were used to mark their scores prior and post using the E-portfolio during learning and training. To support this approach, other data collection methods were implemented such as survey questionnaires and interviews. The section below elaborates more about the data collection methods that have been implemented in this research.

Several way of collecting data were exist in the recent field of research design. The most popular are quantitative research, qualitative and mixed methods approach (Bhattacherjee, 2012). Quantitative research, often, improves on the validity of research instruments as well as providing a numerical dimension to analysis when addressing phenomena (Creswell, 2012). In addition, quantitative studies can simplify human experience, statistically, making the analysis of research findings easier. On the other hand, despite the advantages that have been demonstrated in research deploying the quantitative methodologies, this approach also has some drawbacks. For instance, there is no connection or relation between researcher and respondent, as the respondent seems to be treated like an 'object' or 'unit' in one's study, so the research ends up with a lack of human feeling in the final result (Sarantakos, 1998).

Qualitative studies, on the other hand, take into account the lived experiences, hence enabling contextualisation of the analysis of phenomena, and they allow for an in-depth understanding of phenomena since they are often structured to collect data over an extended period of time (Kothari, 2012). Even though this method seems more difficult to organise and handle due to unexpected human behaviour, the data are acceptable even if gathered from few cases or samples (Sarantakos, 1998).

Apart from those quantitative and qualitative methods that are implemented separately, there is a combination approach which applies quantitative and qualitative methods in one research project to achieve the research objectives. This is called mixed methods research. Creswell (2012) defines mixed methods in his book on Quantitative and Qualitative Research as "*Mixed methods designs are procedures for collecting, analyzing, and mixing both quantitative and qualitative data in a single study or in a multiphase series of studies*" (p.22). Mixed methods enable researchers to address a wide and a more defined range of research questions since they are not confined to one approach. A researcher can use one method to overcome weaknesses in another method and hence have stronger evidence for a conclusion (Yin, 2006). Using both qualitative and quantitative data in a study can, therefore, produce a more comprehensive understanding required to inform decision-making. In addition, combining qualitative and quantitative results can sometimes yield a richer understanding of the phenomenon of interest that either type of result alone (Bhattacherjee, 2012). Besides, mixed methods research is an approach to knowledge (theory and practice) that attempts to consider multiple viewpoints, perspectives, positions, and standpoints (Johnson, Onwuegbuzie, & Turner, 2007).

4.4.1   Justification for choosing a Mixed Methods approach

To choose the correct research design it really depends on the aims that need to be achieved. In this study, some questions need to be provided with measurements such as performance scores to compare the differences of with and without the E-portfolio use and the degree of accepting the E-portfolio process. The other questions need to explore human behaviour such as individual and group perception, emotions, feelings and personal opinions with regard to the E-portfolio application experience. As mentioned earlier, this project requires both a quantitative and qualitative approach of collecting data and evidences; therefore, the mixed methods approach which employs pragmatism as its primary philosophy (Crotty, 2003) had been employed. This method of merging the quantitative and qualitative data helps this research to develop more complete understanding of issues and to examine the

processes and experiences along with the outcomes by deploying the triangulation of methods and sources (Creswell & Clark, 2011).

The literature on E-portfolio studies also reveals that research deploying a mixed methods approach could provide a significant result as satisfactorily as using the single method. Literature shows that several studies involved with the evaluation of an E-portfolio as for a tool to enhance students' performance development and E-portfolio as a communication medium between students and teacher to enhance students' reflection (Oosterbaan, Schaaf, Baartman, & Stokking, 2011) has deployed quantitative methods to collect and analyse the data. For instance, the quantified outcomes will show transparent and interpretable outcomes. While Kocoglu (2008) in his study to obtain the Turkish student teachers' perception of the role of an E-portfolio in individual professional development chose to use qualitative methods to explore opinions and views as well as their personal experience of the system's implementation.

Despite the single method being used in the previous studies, Brown (2009) in his research on evaluating Experiential Learning E-portfolios for undergraduate students in Barry University, Florida deployed a mixed methods approach where surveys were conducted via questionnaires on technical and academic competencies, as well as a focus group and written survey session attended by selected participants to express their experience and opinions about the system's usage. In a study to use an E-portfolio to document and evaluate growth in reflective practice, a two-in-one rubric of evaluation was used to analyse quantitatively the agreement of the respondents and at the same time provide a written survey to obtain participants' experience and views after going through the system's deployment (Pitts & Ruggirello, 2012). A significant result was obtained from a study conducted about using an E-portfolio as a learning tool for dental students, where both quantitative and qualitative assessments demonstrated that students valued E-portfolio learning as a positive experience. For further information and comparison about the methodologies utilised in research that relate to the E-portfolio application, please refer to Table 2.5 in Chapter 2-Literature Review (Page 46)

Therefore, as the pragmatist view allows the use of mixed methods to achieve the research aim, this research has chosen mixed methods as the methodology, which leads to the selection of data collection techniques that suit this method and the objectives to be accomplished.

4.5   Research Methods and Mixed Methods Design

As described earlier, this research has employed both quantitative and qualitative methods to achieve the objectives of the evaluation of the E-portfolio after its implementation in the Skills Training Program.

In this study, the quantitative methods, which are the evaluation rubrics, will investigate the statistics of students' performance in terms of their pre and post deployment of an E-portfolio-based assessment. Then, the survey questionnaires will gather the statistics for the students' evaluation of the E-portfolio process, its benefits, and gather a few demographic details like course taken, gender and computer proficiency scores. These statistics will indicate the acceptance and agreement of the students towards the E-portfolio implementation during training and answer the question: To what extent can the system contribute to being an efficient learning tool for the student?

Meanwhile, previous studies have shown that qualitative research is frequently used in evaluation for a range of purposes (Ritchie & Spencer, 1994). In their research on developing a framework for assessing qualitative research evidence to achieve a high-quality result, Spencer et al., (2003) suggested that a researcher must know the rationale for having this type of methodology. For evaluations of programmes, services or interventions, this includes identifying the factors that contribute to successful or unsuccessful delivery; recognising outcomes (intended or unintended) and how they occur; investigating the nature of requirements of different groups within the target population; exploring the contexts in which policies operate; and exploring organisational aspects of delivery (Spencer et al., 2003).

Thus, in this research which is also envisioned to evaluate the effectiveness of a programme, the E-portfolio system, the data collection for the qualitative part was obtained from the survey questionnaires (additional comments in the questionnaire), email interviews, Facebook postings and online messaging. These methods were intended to explore in depth the user experience, views and opinions, as well as suggestions about the E-portfolio that was implemented for about 5-6 months in each group.

The mixed methods can be implemented in various ways or designs according to particular research objectives. Creswell & Clark (2011) mentioned that there are a few designs that are used in mixed methods research. These designs are:

- Convergent or concurrent designs: The combination of both quantitative and qualitative research with the intent to merge both sets of data to address the study aims and objectives. The data analysis consists of merging data and comparing the two sets of data and results.
- Sequential (explanatory or exploratory) designs: This design is executed with one dataset which was built based on the result of another. Explanatory means the qualitative data are conducted after obtaining the result of the quantitative outcomes. The qualitative data will help to explain in more detail the mechanism underpinning the quantitative results. On the other hand, the exploratory design is intended to explore with qualitative data collection followed by using the resulting qualitative findings to design a quantitative instrument, and then to administer the instrument to a sample from a population.
- Embedded designs: This design uses the quantitative and qualitative approaches as a pair and embeds one in the other to provide new understanding or more advanced rationale.
- Multiphase designs: This design is sometimes called a multiphase project, which employs multiple projects implemented over time and linked together to achieve a common purpose and objectives. They typically include the convergent and sequential elements during the phases.

Therefore, this research has employed a 'Multiphase design', which aims to investigate and evaluate the use of an E-portfolio system over time. The phases started in 2012 where Phase I, the preliminary study, was conducted with the aim of exploring the views of the MSTP stakeholders of planned E-portfolio application in the Skills Training Program.

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Based on the outcomes and considering the lessons learnt from Phase I, the application was deployed to the 2013 student cohort, which comprises three groups of courses, and to the four groups in the 2014 student cohort. For both years of implementation, the data were collected using convergent and sequential approaches where the survey questionnaires were conducted along with communication through Facebook (FB) to obtain views about the E-portfolio process being deployed. Outcomes from both rubrics of assessment and the survey were then analysed. Consequently, the email interview and further FB communications were conducted to explore more about the implementation, and the keywords "why" and "how" certain circumstances in the rubrics and survey happened were queried during the interviews.

Ultimately, the results from both quantitative and qualitative data were analysed, compared and merged through the triangulation approach to produce meaningful findings at the end of the process. Figure 4.2 below illustrates the whole theoretical and methodological approach underpinning this research project.
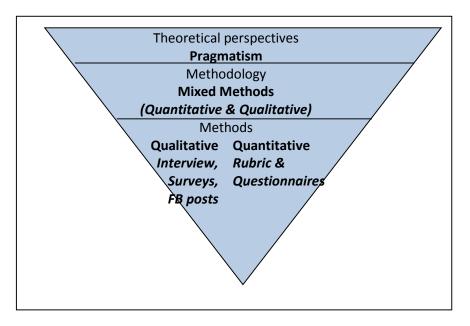
Figure 4.2 The Research Elements underpinning this research

In addition, during the project cycle, observations like statistical usage and informal communication with users via online messaging were also undertaken to identify the best strategies to run the system. This is to ensure that, when every cohort has finished, the

lessons learnt from the previous cycle will be taken into consideration to plan for the next cohort. After both the 2013 and 2014 cohorts ended, the results were compiled and analysed. The explanation about the research cycle will be presented in Chapter 5-Research Activities and Data Analysis.

4.5.1 Data Collection Methods

In this section, I will briefly describe the definition of the data collection methods selected and justify why they are suitable to be deployed in this research project. The methods include both quantitative and qualitative which are evaluation rubrics, survey questionnaires, email interviews, online messaging and Facebook postings.

For each method, the details of its process are also explained to ensure that the methods were approved and reliable to be implemented based on previous research as well as the requirement of the project.

4.5.1.1 The Evaluation Rubrics

Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give expression and sense around an assessment topic. Analysing documents include coding content into themes, similar to how interview transcripts are analysed. A rubric can also be used to grade or score a document.

There are three primary types of documents (Bowen, 2009):

    i.   Public Records: The official, ongoing records of an organisation's activities. Examples include student transcripts, mission statements, annual reports, policy manuals, student handbooks, strategic plans, and syllabi.

    ii.   Personal Documents: First-person accounts of an individual's actions, experiences, and beliefs. Examples include calendars, emails, scrapbooks, blogs, Facebook posts, duty logs, incident reports, reflections/journals, and newspapers.

iii.   Physical Evidence: Physical objects found within the study setting (often called artefacts). Examples include flyers, posters, agendas, handbooks, and training materials.

While a rubric is a list or chart that describes the criteria that one uses to evaluate or assess student performance. Rubrics are helpful tools in assessing student learning, especially for areas like behaviour or performance, which can be difficult to capture in more traditional assessment techniques such as surveys. Types of rubrics include:

i.   Checklist rubric: A simple list of requirements (dimensions) and whether the requirements were met.

ii.   Rating Scale rubric: Documents the requirements (dimensions) and allows the rater to rate those requirements on a scale.

iii.   Analytic rubric: Documents the requirements (dimensions) using a scale and a description of the dimension at each level on the scale, with one dimension per line on the rubric.

iv.   Holistic rubric: Includes all of the elements of an analytic rubric, but combines them into one larger dimension rather than one dimension per line.

Document analysis is one of the qualitative methods that served mostly to complement the other research methods. Despite the advantages of this method, such as stability, exactness, broader coverage, cost effective and high chance of availability, document analysis also may experience drawbacks; for example, it might increase biased selectivity among respondents, insufficient information in one document, and sometimes has low retrieve-ability when it comes to confidential or high-profile documents (Bowen, 2009).

In this research, the documents used in the study are student evaluation rubrics regarding using the E-portfolio during courses and the Facebook post from the Official Facebook E-portfolio research page. This document could feed in additional information about the evaluation of the E-portfolio along with other methods like questionnaire and interviews. An evaluation rubric which was adopted from the work of Pitts & Ruggirello (2012), 'Using the E-portfolio to document and evaluate growth in reflective practise' was deployed to rate students' performance pre and post deployment of the E-portfolio. Six

criteria were assessed: Organisation of Idea, Report Format, Progress of Report, Quality of Report, Communication with Instructors and Communication with Peers. These six criteria are included in the CBT characteristics which are Progress-based learning, Social Communication and Knowledge construct. The rubric of assessment can be found in Chapter 5, Table 5.13.

The findings are very important to show if there is any significant difference between pre and post scores. Other than that, the difference between courses and years also might provide important information to indicate whether the participants' course could influence the use of E-portfolio during training. A total of 59 pre-deployment rubrics and 59 post-deployment rubrics were assessed and filled in by the instructors. The instructors were asked to key in the scores in the Excel documents created by the researcher to ease further analysis. The result of these rubrics can be found in Chapter 5-Research Activities and Data Analysis.

4.5.1.2 Survey Questionnaires

Many methods exist for obtaining information about people. A survey is only one. Surveys are information collection methods used to describe, compare or explain individual and societal knowledge, feelings, values, preferences and behaviour (Kazi & Khalid, 2012). A survey can be a self-administered questionnaire that someone fills out alone or with assistance, or it can be an interview done in person or on the telephone. Some surveys are on paper or online, and the respondent can complete them privately at home or in a central location – say, at a community centre. The respondent can return the completed survey by post, electronic mail or online application. Surveys can be interactive and guide the respondent through the questions. Interactive surveys also may provide audio-visual cues to help (Meho, 2006)

Some researchers have stated that the questionnaire and interviews are part of the survey technique that is, to achieve purposeful data from the respondents in one's research. Fink

(2009) mentions at least three good reasons why a survey should be conducted in an education study:

1. When a policy needs to be set or a programme must be planned, there must be a survey to convey intention and gather people's views.
2. To evaluate the effectiveness of a programme or new methods that intend to ameliorate the current system of teaching and learning.
3. To obtain information from the previous or current students such as performance, activities and learning style so it will become guidance for the upcoming batch of new students.

Two sets of questionnaires have been used in this research. The first questionnaire was executed early in the study (Phase I), where it was intended to obtain students' early perception regarding E-portfolio implementation in the Skills Training Program. The second questionnaire was an evaluation survey to indicate the effectiveness of the E-portfolio processes during the implementation. The processes of developing, reviewing and piloting the two questionnaires were similar. Only the content differed according to the objectives that had been set.

The first survey, which is the perception survey, was a combination of multi-format survey comprising multi-choice, single-choice, ranking and Likert scale. Each question clearly defined the purpose and provided clear instructions. There were 10 general questions in this survey. The details of the content are explained in Chapter 5 - Research Activities and Data Analysis.

The evaluation survey that was used as the primary quantitative data collection method was a Likert scale-type questionnaire. Likert-type or frequency scales use fixed choice response formats which are designed to measure attitudes or opinions. These ordinal scales measure levels of agreement/disagreement. A Likert-type scale assumes that the strength/intensity of experience is linear, i.e. on a continuum from strongly agree to strongly disagree, and makes the assumption that attitudes can be measured. Respondents may be offered a choice of five to seven or even nine pre-coded responses with the neutral point being neither agree

nor disagree (Creswell, 2012). Both perception and evaluation survey questionnaires can be found in Appendix.

In this research, I chose a 5-point Likert scale-type due to the simplicity, as those respondents were from vocational backgrounds who always lack motivation to think in detail and prefer something they can clearly understand quickly (Zulkefli et al., 2012). Other than that, I also decided to use a 5-point Likert scale due to its advantage of allowing for degrees of opinion, not just simple yes/no answers. These data can then be analysed with relative ease, depending on the research objectives set (Kothari, 2004).

Questionnaire Development Process

The development process of the questionnaire involved a few stages, beginning with drafting until the proofreading process by a verified translator. For the perception survey which was deployed during the early study, 10 items and five additional demographic items were developed by considering a few past behavioural questionnaires from research that had been validated (Attwell, 2006; Lederer, Maupin, Sena, & Zhuang, 2000; Shroff, Deneen, & Ng, 2011; Van Raaij & Schepers, 2008). These researchers had mostly been conducting acceptance and perception analysis of the E-learning user. I had to reorganise the questions and choose only relevant inquiries and answers to be inserted into the survey. The explanation related to this questionnaire is explained in the section Sources of the questionnaires.

On the other hand, the evaluation survey which was conducted after the E-portfolio implementation had 50 items and four additional demographic items. There are 10 themes or factors, each with a different number of items. In each factor, there is also one open question provided in the free-text box to be completed by participants. The information in this free-text box was used as qualitative data as respondents could freely express their opinions related to the themes. As agreed by Malterud (2001) and Dimond et al. (2004), text boxes inserted into a questionnaire can help the researcher to explore in depth about respondents' willingness to participate in the study as well as to strengthen their views on each theme.

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The initial language used was English. The complete draft was sent to be reviewed by two English Secondary School teachers from Malaysia. After receiving the comments and corrections, the draft was amended accordingly. However, the language use in actual implementation is Malay. Therefore, the questionnaire, which was in English, was translated into Malay by myself and reviewed by one English teacher. Then, the Malay version was proofread by a Malaysian Secondary School teacher who teaches Malay Literature, as well as holding the position of language officer in the Ministry of Education. The Malay language draft was then sent to three relevant parties: the students and lecturers of E-learning in the MARA Professional College, Malaysia, the Instructor of Kitchen Department in the IKIP Advanced Skills Centre and the Vocational Training Officer in the Ministry of Human Resource, Malaysia.

The comments obtained were:-

    i. There are a few questions with too many words. Please make it simple, shorter and understandable.

    ii. There are too many questions. Please reduce them, but make them pertinent.

    iii. There are a few questions that demand explanation because the words used are complex and hard to understand. Please choose simpler words that suit the level and ability of the students.

    iv. There are a few questions that have the same meaning, but which are repeated twice or thrice. Please avoid the repetition.

    v. Please add more advice and encouragement in the front page of the questionnaire to enhance the students' motivation to fill in the questionnaire.

The suggestions were taken into consideration. Based on the comments received, a few questions were modified to eliminate confusion and enhance comprehension. A few of them were taken out. Simpler words were incorporated. The front page of the questionnaire was amended to include the objectives of the survey and the role of the participants. The amended draft was again submitted to the officers for verification. Finally, for the

evaluation survey only 55 items were accepted for the questionnaire. For the perception survey, all the questions were accepted accordingly.

To enhance the quality of the content, I brought the evaluation survey to be discussed and reviewed in the doctoral meeting that was held monthly in the Faculty and also to my monthly supervisory meeting with the supervisory team. From these discussions, I added inquiries for some demographic details, for instance, course taken, gender and computer proficiency skill, so this information could give a broad perspective on the relation of participants' backgrounds with the E-portfolio implementation. The analysis might provide rich findings on how gender and computer skills affect students' ability to benefit from the E-portfolio.

Finally, the questionnaires were again translated into Malay by the researcher with the help of an English teacher. As mentioned by Kazi & Khalid (2012), translation of a questionnaire is important if an instrument is not available in a language understood by the target population. This is to ensure that the respondents will feel motivated to respond and provide feedback if the inquiries are at their level of understanding. To approve the translation, the translated questionnaire was then reviewed and amended by a proofreader in Malaysia who is a Malay Literature Officer in a Malaysian Secondary School.

The questionnaires were piloted to a small number of students in an E-learning subject at MARA Professional College, Malaysia. Based on the result and recommendation from the statistical outcomes, the factors and items were reorganised to improve the reliability of the questionnaire. The perception survey was executed to actual participants within two months prior to the implementation of the E-portfolio system. Following this, the improved evaluation survey questionnaires were implemented to actual participants of two cohorts of students and instructors in 2013 and 2014.

Sources of the questions

Apart from the main research question, which was to evaluate the E-portfolio effectiveness in the Skills Training Program, the additional objectives were to investigate the early perception of the students' behaviour and acceptance of this system Thus, the perception survey was conducted during Phase I study just before they started the E-portfolio system in class. The questions in this survey were derived from a few existing questionnaires that had the same purpose from past research (Attwell, 2006; Lederer et al., 2000; Shroff et al., 2011; Van Raaij & Schepers, 2008). The questions were adapted and structured according to the aims of the survey.

The main research questions are to investigate the effectiveness and to evaluate the implementation of an E-portfolio process that adopted both Competency-Based Training (CBT) and KEL(KEL) theories for use in Vocational Training Education. Therefore, the main source of questions must be derived from these two theories. Criteria from these two theories were studied and analysed. The items were also inspired from past research that conducted an evaluation of E-learning and measured the impact of E-learning and E-portfolio. Some of the items from each factor were adopted from past established questionnaires that have been used for research into E-learning evaluation (Attwell, 2006; Becta, 2007; Chang, 2001; Gerbic et al., 2009; Jara, Mohamad, & Cranmer, 2008). Finally, about 12 themes with 55 items were created. The themes that exert influence on the E-portfolio process are identified as follows:

1. Objectives-Based Instruction

According to McCowan (1998), in a CBT environment, it is necessary to provide a task assignment that is equipped with the set of instructions and its objectives. This is to promote the understanding of the task so a person could anticipate what the outcome would be. In the E-portfolio application, the set of Instructions includes a guide on how to prepare a Performance Assessment using this system. The documents were developed based on the assessment question, assessment criteria and the module requirements. The document

clearly stated the objective of each task involved. So it is vital to investigate whether the E-portfolio process has effectively fulfilled this criteria. The items within this theme will ask about users' understanding of the set of E-portfolio Instructions and how the documents could be improved.

2. Hierarchical Instructions

McCowan (1998) also mentioned that CBT directly incorporated Skinner's techniques of using a sequenced hierarchy of objectives and frequent testing and feedback to assess learner performance (Skinner, 1968). Skinner has influenced the design of CBT curricula by carefully sequencing instructional material and presenting it in small steps. Therefore, this theme consists of items that will investigate the effectiveness of the 'Plan' function that has been provided in the E-portfolio process. Besides, the question also asked about the understanding of a competency standard in each task as requisite in the Skills Training Education.

3. Progress-Based Learning

Dewey's Progressive Education has been described as a form of pragmatism, although he favoured the term "instrumentalism" or "experimentalism" (McCowan, 1998). Progressive educators stress student-centred, rather than subject-centred instruction, activities rather than formal learning, and laboratory, workshop, or vocational education rather than traditional subjects. This factor is one of the main objectives in the E-portfolio process where it intends to improve student understanding of the progress of work. The items in this factor will provide information on student understanding of the assessment process and how it will be assessed. It also contains items to obtain students' views on the influence of the E-portfolio process on their work progress.

4. Learning Responsibility

As described in Progress-Based Learning, CBT needs a 'student-centred' environment which allows students to decide the way they prefer to execute learning. It is the students' responsibility to determine how they are going to achieve the task objectives, with guidance from the instructor. This was supported by Kolb (1984) where he said that the learning instruction should provide freedom for the student to find the best way of doing it. By so doing, the student will gain more experience to determine the correct and incorrect ways of doing it . In the E-portfolio process, the instruction provided is a guide for the student to accomplish the assigned task. The instruction encourages the students to explore the system themselves. The items in this factor are to measure how far the student has employed the E-portfolio during the assessment process. The processes like Insert materials, Update materials, Update feedback and Submit the final assignment are important to explore in order to achieve the full benefits of the system.

5. Reflection

Many researchers have mentioned the role of the E-portfolio to promote reflection towards learning that can be observed using feedback, personal satisfaction, learning outcome and end result (Atif, 2013; J. O. Brown, 2011; Connolly et al., 2010; Frahang Jaryani, 2010; Nor et al., 2012; Ross & Welsh, 2008). In CBT also, research from Ghazali (2004), Spady (1977) and Tran & Nyland (2013) has shown that reflection plays an important role to enhance students' understanding of learning and to improve their performance. Kolb also mentioned that reflection is one of the main features in his theory where every experience of learning is gained with the reflection embedded in it. Otherwise, the knowledge becomes less meaningful. In the E-portfolio process, the reflection can be generated during feedback and discussion sessions. Instructors and peers are the actors who need to review and give comments on each other's work. The student will respond to the comment and improve their assignment before final submission. The items in this factor will obtain information on students' behaviour in terms of others' perception of them, self-reflection, and how far the E-portfolio has helped them to accept comments and respond to them.

6. Assessment

Both CBT and KELagree that the way to assess a student's ability in a specific task is by conducting an assessment after the student has the necessary experience and is able to accomplish the specific task objectives and competencies standard (Kolb, 1984; McCowan, 1998). The E-portfolio process is blended with Skills Training performance assessment. The prerequisite of this assessment is that the students need to execute a practical/hands-on session before completing a written report which needs to be submitted via the E-portfolio account. For that reason, items in this theme are related to this process of assessment and how the E-portfolio process is involved.

7. Prior learning

Prior learning experience is one of the considerations incorporated into CBT (McCowan, 1998). In addition, Kolb also mentioned that prior learning could feed knowledge about previous experience so that it can be a basis in developing new ideas. In this theme, the item is developed to investigate whether students were using their prior learning experience to develop the assignment. This is necessary for the E-portfolio process as this theme will drive students to produce an exemplary outcome in one E-portfolio.

8. Knowledge Construction

KEL explains about how experience could turn into knowledge when a person truly deepens the process of doing the thing. In the E-portfolio process, the students were asked to explore Internet technology to find useful materials and exemplars for reference and place these in their E-portfolio account. Then, using these materials, they will need to develop the task according to the specific condition. This process of exploring technology is also applied in the CBT environment, where the student has to experience the practical process before preparing a report (Ghazali, 2004; Voorhees, 2001). It is believed that this experience could develop knowledge. The items in this theme will confirm the process of

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the E-portfolio in terms of seeking information on the Internet, inserting materials in the E
-portfolio and how this process could assist students to better understand the assigned task.

9. Learning Motivation

In CBT, every instruction needs to be designed so it will suit the ability of the students at each level of the training course. It is believed that this could enhance students' motivation towards learning. Skinner, in his journal article on 'Teaching Machines', stated that, to improve students' passion to learn, it is necessary to assist them with some kind of machine or tool (Skinner, 1958). This theme consists of items that are relevant to obtain information about the E-portfolio as a tool to improve students' motivation in completing the assignment, whether it is down to him/herself or in a group discussion.

10. Social and Private Learning

CBT is an amalgamation from leading learning theorists and includes elements of programmed instruction, specific behavioural objectives and social learning techniques (Magnusson & Osborne, 1990). KEL also said that learning could happen through experience, either from social relationships or personal involvement (Kolb, 1984). The process of the E-portfolio includes instruction that needs students to get involved with their peers. The tasks were assessed individually, but students are allowed to prepare and develop them in the group. The items in this theme will find out the effectiveness of the E-portfolio as a tool for enhancing communication with peers and also aims to measure the usefulness of the sharing function.

11. Unique Learning Style

According to KEL, to understand how a student can learn effectively is to understand the student's style of learning (Kolb, 1984). Coffield et al. (2004) mentioned in their report on learning styles that every student has their own preferred learning style. There is no one single method that is suitable for everyone because every person has a unique style of

learning, understanding, reflecting and responding. Therefore, to create an E-learning experience that effectively engages students in the learning process and leads to a high level of student satisfaction, this factor contains items to investigate the student preference for using the E-portfolio. Either they prefer to use it at home or in the campus, alone or with peers and during class time or beyond lecture time. The result can assist the lecturer to plan the best way to attract students to engage with the system.

12. Instructor Engagement

Skinner (1958) believes that whatever tools or machines could assist a student to learn, the teacher should be a driver to present the materials and steer the student to reach the correct destination. In this E-portfolio process, the instructor plays a very important role to administer and help the student to achieve their objectives. The engagement of the instructor will determine the success of the E-portfolio application. Even though the students are supplied with manuals and online assistance from the researcher, the presence of the instructor will increase their confidence to continue engaging with the system. The items in this theme will obtain information about instructor and researcher engagement during the deployment of the application.

Validity and reliability of the questionnaire

Validity

Validity is the degree to which an assessment measures what it is supposed to measure. Basically, there are three types of validity: i) content validity, ii) criterion-related validity, and iii) construct validity. A questionnaire undertakes a validation procedure to ensure that it accurately measures what it aims to do, regardless of the responder. A valid questionnaire helps to gather better-quality data with high comparability, which reduces the researcher's effort and increases the reliability of the data. A valid questionnaire must have following characteristics: (i) simplicity and viability, (ii) reliability and precision in the words, (iii)

adequate for the problem it is intended to measure, (iv) reflect underlying theory or concept to be measured, and (v) capable of measuring change (Kazi & Khalid, 2012).

To ensure the questionnaire is suitable to be used for E-learning participants, the draft was reviewed by two students and two lecturers of E-learning subjects in Malaysia. Then, to check the items and factors related to Competency-based training, two instructors from the Skills Training Institute and an Officer from the Ministry of Human Resource were asked to perform the process. To improve readability and grammar, two language teachers were involved and suggested corrections. The questionnaire also had been discussed and critically reviewed in a Doctoral Meeting workshop lead by two senior lecturers from the Faculty of Education, Community and Leisure, LJMU. This is to gain opinions from the persons who are not in the E-learning area, which help me to identify the issue like biases on the questions and unclear objectives. In the light of the discussion and suggestions from the Doctoral members, the questionnaire was then taken forward to be reviewed by an expert on the SPSS (Statistical Package For Social Science) software in the Faculty to analyse it for reliability, improve the questionnaire items and reduce ambiguities. Finally, the questionnaire was discussed with the supervisory team before being piloted.

Reliability Testing

Validity and reliability are important in any instrument development, where validity is described as the ability of the instrument to measure what it is supposed to measure and reliability is the instrument's ability to consistently and precisely measure the concept under study (Coughian, Cronin, & Ryan, 2007). Sekaran (2003) mentioned in his book that there are times where the reliability will be determined by testing for both consistency and stability. In addition, reliability also specifies how well the items measuring a concept cope together. Thus, for this study, the Cronbach's alpha coefficient test was employed to measure the reliability. Nunnally & Bernstein (1994) suggested in their book that data analysis can be considered reliable based on the value of Cronbach's alpha coefficient as follows:

I. A value of 0.70 should be considered for exploratory research

II.   A value of 0.80 should be considered for basic research

III.   A value of 0.90 is better used in applied research

As mentioned before, the items on the evaluation questionnaire were developed based on the criteria of CBT and KEL theories. A total of 55 items (variables) and 12 pre-determined themes were formed after going through the validity process. The variables created reflected the evaluation of the process based on each construct. The variables represented the anticipated outcome that should be achieved in the project implementation. This would determine the evaluation and acceptance of the user in relation to the E-portfolio process and its impact on the learning process. Eventually, the questionnaires were piloted to a small number of students to improve reliability in terms of grouping and confirming the items with their correct themes (constructs). The analysis of factors to measure correlation was executed using the Principal Component Analysis technique in SPSS.

Principal Component Analysis

Principal component analysis is usually defined as a variable reduction procedure as it measures redundancy and suggests unnecessary variables to be removed. Redundancy means that some of the variables are correlated with one another, possibly because they are measuring the same construct. This procedure always raises confusion with the exploratory factor analysis, where both methods can be used to identify groups of observed variables that tend to hang together empirically (O'Rourke & Hatcher, 2014). However, there are slight conceptual differences between these two in terms of the assumption of an underlying causal structure. Factor analysis assumes that one or more latent variables (factors) exist that impose a causal influence on these observed variables. Therefore, the exploratory factor analysis helps the researcher to identify the number and nature of these latent factors. On the other hand, principal component analysis makes no assumption about an underlying causal model. Principal component analysis is simply a variable reduction procedure that usually results in a relatively small number of components that account for most of the variance in a set of observed variables (O'Rourke & Hatcher, 2014). To run

the principal component analysis of the questionnaire, a pilot study must be executed to gather results.

As a pilot study's sample size will depend on the particular purpose of the pilot study (Johanson & Brooks, 2009), Connelly (2008) mentioned that extant literature suggests that a pilot study sample should be 10% of the sample projected for the larger parent study. Nevertheless, Isaac & Michael (1995) suggested 10–30 participants will give many practical advantages to the social science researcher, such as to facilitate calculation, easiness and ability to measure hypotheses (Johanson & Brooks, 2009). This is supported by Hill (1998) where he suggested that 10 to 30 participants for pilots in survey research is adequate for research involving Internet studies. In this study, the evaluation questionnaire was piloted to 52 Higher Diploma students in one of the public institutions that deploy E-learning as part of their course. Based on the literature described, this is a quite generous number as the actual participants that will be taking part in the main project is approximately 60-70 participants.

Upon obtaining the survey response, I conducted the principal component analysis to measure the inter-item correlation so that the items can be grouped according to suitable themes. After going through the process, only 50 items with 10 themes/constructs from the 12 initial themes were extracted. Each item was grouped in respective factors. There are 5 items that happened to have redundancy with other items, thus the most related items were selected. The new factors are as described in Table 4.2. Each factor was calculated for its reliability based on the Cronbach alpha values to confirm whether the factor items are correlated or vice versa (refer to Table 4.2).

Table 4.2 The questionnaires Items and the Reliability Scores

Factor	Item	Reliability Statistics (Cronbach's Alpha test)
Objective-Based Instruction	1. I can understand the E-portfolio's manual of instruction. 2. I can understand the E-portfolio deployment process in the module. 3. Each E-portfolio instruction was structured to suit tasks in the module.	0.860
Hierarchical Instructions	1. Each task has a level of competence to be achieved. 2. I do understand the competencies standard which needs to be achieved in the task involved. 3. I can anticipate the outcome of the assignment by using the 'Plan' function in the E-portfolio.	0.795
Progress-Based Learning	1. The assignments were assessed individually, even done in a group. 2. The assignments were verified upon completion of complete final product/outcome. 3. Assignments were also assessed based on the progress of work. 4. I do understand that the progress of work is as important as the final product/outcome 5. I do understand that the final product/outcome is very valuable to determine my competency of performance. 6. E-portfolio helped me to be alert with the progress of my work	0.837
Learning Responsibility	1. I did insert the progress of work into my E-portfolio account. 2. I also included all materials related to the assignment into my E-portfolio (such as images, video, audio). 3. I always update my assigned task into the E-portfolio. 4. I did submit the final outcome of the assignment into my E-portfolio. 5. Using the E-portfolio, I can organise my report well.	0.875
Reflection	1. I have to do the practical task before creating a report. 2. Practical training does help me to supply information for the report.	0.901

	3. Sometimes, I consider my prior knowledge and experience to plan new ideas for the report. 4. I like to accept comments from others related to my work. 5. I can reflect on my mistakes from others' comments. 6. I am aware of my mistakes and make sure they don't happen again. 7. E-portfolio helped me to record the assigned task so it can be reviewed by others.	
Knowledge Construct	1. I like to seek information through the Internet. 2. I did insert materials from the Internet into my E-portfolio. 3. E-portfolio creates a workspace between me and group members. 4. E-portfolio has helped me to comprehend my task that had been assigned to me in a group.	0.819
Learning Motivation	1. Having a group assignment improves my motivation to learn. 2. E-portfolio enhances my motivation to accomplish the group assignment. 3. E-portfolio has helped me to accomplish my assignment. 4. I think the E-portfolio is a good tool to be deployed during training sessions.	0.876
Social and Private Learning	1. I do understand that the result of group work involving cooperation from all members of the team. 2. E-portfolio has helped me to communicate with peers. 3. E-portfolio has helped me to communicate with Instructors. 4. E-portfolio has a privacy function to limit the work that I don't want to share with others. 5. E-portfolio allows me to choose whoever I want to view my work. 6. I like the privacy function provided in the E-portfolio.	0.804
Unique learning style	1. I think I like to use this E-portfolio during training. 2. I feel this system is difficult to use somehow. 3. I am more confident to use E-portfolio with my peers. 4. I prefer using E-portfolio on campus. 5. I prefer using E-portfolio off campus. 6. I like to use E-portfolio individually (alone).	0.861

Instructor Engagement	1. The Instructor looks expert when using the E-portfolio. 2. I did understand what has been taught about the E-portfolio by the Instructor. 3. My Instructor always assists me when having problems during E-portfolio deployment. 4. I contact my Instructor immediately if a problem occurs. 5. I also contact the system admin to seek for a solution. 6. Overall, I am satisfied with the assistance provided during the usage of the system.	0.857

Overall reliability value for the whole items was 0.967   *Source:Self-Study*

The alpha coefficient for the whole items is 0.967, suggesting that the items have relatively high internal consistency. Moreover, for each factor, all values show above 0.7, which means each of the items was highly related with each other in one factor. (*Note that a reliability coefficient of .70 or higher is considered "acceptable" in most social science research situations.*)

The questionnaire was re-structured and amended based on these findings before actual implementation. The questions in the 'Assessment' and 'Prior Learning Experience" factors were placed in the 'Reflection' factor due to a higher correlation between them. Ultimately, 10 factors were confirmed with 50 items in total.

Finally, the questionnaire was transformed into an online version using the *limesurvey* application.

Components and Rationale of the questions

As mentioned earlier, for the evaluation survey, question items were derived from a few sources of studies on the evaluation of E-learning (Attwell, 2006; Jara et al., 2008). However, the questions then were modified and restructured based on the decided themes, which takes into account the characteristics of KELtheory and competency-based training features. Thus, the questionnaire has a different number of questions based on its theme. The rationale behind this is elaborated as follows:

- The main features in Skills Training that need to be emphasised in the E-portfolio process are the progress of learning, the collaborative learning with colleagues and the instructor engagement during learning (Dollah et al., 2012). Therefore, it explains why these features, which are represented by 'Progress Based Learning', 'Social and Private learning' and 'Instructor Engagement', have more questions than the other factors.

- The factor 'Unique learning style' contains more questions to investigate the way the student prefers to use the E-portfolio. This is because the information obtained from this theme could provide guidance for the future implementation of the system.

- The factor 'Reflection' has seven questions because it included the questions from the 'Prior Knowledge' and 'Assessment' themes, which were initially determined at the earlier version of the questionnaire. After going through the Factor Analysis, the items under these two themes were grouped in the 'Reflection' theme.

- The other five factors contained three to five questions, which is adequate to obtain information on each factor.

To enhance the questionnaire to be more useful and provide rich data, a Free Text Box was included in each factor. These free spaces, where students could express more about each factor and the function of the E-portfolio itself, were one of the qualitative methods that I adopted to investigate the participants' views and experience. This concurrent mixed method is allowed in order to generate data for both quantitative and qualitative research objectives (Teddlie & Yu, 2007). The open questions were as follows:

Table 4.3 The open questions included in the survey questionnaire

Factor	Free Text Questions
Objective-Based Instruction	In your opinion, how can the E-portfolio's Set of Instructions be improved?

Hierarchical Instructions	What is your opinion about the E-portfolio's PLAN function?
Progress-Based Learning	To what extent has the E-portfolio influenced your progress in the assignment?
Learning Responsibility	To what extent has the E-portfolio influenced your effort of learning?
Reflection	In your opinion, to what extent has the E-portfolio use impacted on your learning reflection?
Knowledge Construct	What is the role of the E-portfolio during the learning process in constructing new knowledge?
Learning Motivation	Please comment on how the E-portfolio has influenced your personal motivation during the learning process.
Social and Private Learning	To what extent has the E-portfolio influenced your social relationships? Please comment.
Unique learning style	Can you explain what did you like and dislike **most** about this system?
Instructor Engagement	Can you explain about the assistance you experienced during the EE-portfolio deployment process?
Summary	What do you think of this system in terms of influencing your learning and training session?

Source: Self-Study

The questionnaire also asked demographic details such as gender, computer proficiency and course taken. The output showed whether there was any relation between those details and the use of the E-portfolio.

Questionnaire distribution and collection

Electronic and web-based questionnaires, including data collected through personal digital apparatus (PDAs), smart phones and cell phones, are recent techniques for questionnaire administration. The questionnaire can be designed to filter and screen participants' responses, and checks for input error, range and skip patterns can be incorporated, preventing significant typing and data format error. However, an electronic questionnaire

is restricted to those participants who have access to a computer and the Internet, and this can be a potential bias (Kazi & Khalid, 2012).

Group-administered questionnaires have some advantages over mail and self-administered questionnaires. For example, all the respondents answer the questions in the same order and time. The one disadvantage of group-administered questionnaires is contamination through copying, talking or asking questions (Hüseyin, 2009).

From the 2013 cohort, Twenty-seven respondents were expected to complete this questionnaire as well as thirty-two respondents of the 2014 cohort, which was executed using an Internet application. The questionnaires were distributed using an online method at *www.limesurvey.org*. The questionnaire was open to access after all students had sent their final submission report to the instructor. The duration to fill in the questionnaire was allocated a month. The link was published in the *Facebook* Group of the students, as well as by Email notification. A notification in the E-portfolio messaging system was also made. The students were advised to spend approximately 10-15 minutes filling in the online questionnaire after class. The three computer laboratories' opening hours were extended to 30 minutes past normal closing time during that month. The labs were also open for 30 minutes during lunch hour (1pm-1.30pm) to facilitate access. A lab technician was appointed to monitor the computer usage in case there was a student who was less skilled in operating the computer and the application.

To prevent fraud or fake user, this link was only accessible from the campus network. The Internet Protocol (IP) address was monitored by admin to ensure the response was obtained from an on-campus machine.

A friendly reminder was sent twice before the end of the month via email, Facebook Group notification and E-portfolio messaging system. The instructors also helped to encourage and remind the students to fill in the online questionnaire. Finally, the anticipated total of 59 students to fill in the questionnaire was successfully achieved, even though it took a longer time than expected.

Both questionnaires (perception and evaluation survey) can be found in Appendix 11 and 12.

4.5.1.3 Interviews

Interviews are one of the favourite methods frequently adopted by most qualitative researchers in social and humanity studies and some quantitative research. The interview can be declared as the primary data collection technique widely executed all over the academic world. An interview can be defined as a meaningful conversation between two parties, which are the interviewer (normally a researcher or co-researcher) and the interviewee or respondent (Fink, 2009). The purpose of interviewing is to explore and investigate the respondent's opinion, agreement, disagreement or even suggestion on certain issues in the research topics. The interview could be classified in a few categories like structured interviews, semi-structured interviews and unstructured interviews(Meho,2006).

a. *Structured interviews*: In this category, the researcher has a pre-determined list of close-ended questions to be asked to the respondent. Even though this type is easy to conduct and could prevent long responses, the close-ended questions might stop the respondent from elaborating further about a topic. This might raise issues like lack of data and insufficient information.

b. *Semi-structured interviews:* This type is quite flexible where the researcher could prepare pre-determined questions, but there is a possibility to change and modify the order or the wording of the questions. The researcher also has the ability to ask additional questions as needed to explore the research questions and objectives. Although this process may be time consuming and the respondent may get bored, the chance of data richness is high.

c. *Unstructured interviews*: This kind of interview is informal and generally has one open-ended question to trigger the respondent at the beginning of the conversation. The researcher and respondent could talk freely about a topic in a specific time. Despite the abundance of data that could be gathered through this

method, the process of analysis is quite challenging and time consuming due to mixed information in a conversation.

The medium of interviewing people could be formed in many ways, such as face-to-face interviews, telephone interviews, online interviews and email interviews. The researcher should choose the most suitable method by considering the facilities of both interviewer and interviewees, the research duration, the culture of the respondent and the agreement of the participant (Gill, Stewart, Treasure, & Chadwick, 2008). There are lots of data collection techniques and each has its own characteristics. Table 4.4 illustrates the most popular techniques used in research.

Table 4.4 The comparison of survey types (*Adapted from Fink (2009)*)

	Interviews / Surveys			
	Mailed	*Online*	*Telephone*	*In Person*
Characteristics	Written or 'paper and pencil'	Reached directly through a web address or a link in the respondent's email	An interviewer uses telephone to contact the respondents	Interviewer meets the respondents in a mutually acceptable place
Advantages	Can reach large geographic areas People are used to completing paper and pencil surveys Can take the survey with you and complete it everywhere	Worldwide information is obtained immediately (in real time) Can give respondents links that explain unfamiliar words and help with difficult questions Easier to send reminders to respondents Easier to process data because responses can be downloaded to a spreadsheet, data analysis package or database Ability to make complex skip pattern questions invisible to the respondents	Can explore answers with respondents Can assist respondents with unfamiliar words Some people enjoy telephone contact No worries about interviewer's appearance	Same as telephone Some people prefer direct contact with the interviewer Could have spontaneous responses leading to richness of data

Disadvantages	Need a motivated sample to return the survey Many people think they have too much to do without also having to complete surveys Respondents must be able to read, see and write	Need reliable access to the Internet Respondents must be able to use a browser Questionnaires must be compliance with different platforms and browsers Respondents may have different levels of computer expertise The sample in an online survey is not really a random sample The system can 'go down' or be unreliable	Need trained interviewers Need to make sure respondents are home and have plans to follow-up messages left on answering machines or voice mail Many potential respondents are suspicious of unsolicited telephone calls Need to make sure the respondents expect to be surveyed	Need trained interviewers Must find a suitable place and time to conduct interviews, which may not be easy given respondents' schedules
Special needs	Current mailing address list Follow-up mailings Incentives	Current email addresses Technical expertise or resources to deal with application development A convincing method of ensuring privacy and confidentiality A well-known or respected name in the 'from' column of the respondents' email program Incentives	Current phone numbers Schedule for reaching respondents Incentives	If on-site, need space and privacy May be difficult or dangerous to go to the person's home Incentives
Costs	Printing, paper, envelopes, stamps, incentives	Online application if licensed Design time if developing own survey	Training and supervision. Incentives, telephone charges Time to organise call	Travelling to respondents' place Time and energy Maybe training needed

Email-Based Interview – A semi-structured Interview

For this research, I chose to conduct email-based interviews with semi-structured questions to obtain perceptions and views from the E-portfolio participants and the stakeholders of the Skills Training Program. E-mail interview is one of the interview methods implemented by researchers to obtain responses from research samples using electronic mail approaches. Several researchers have discovered the advantages and challenges of using E-mail interviews in their research (Burns, 2010; Gibson, 2010; Meho, 2006). Advantages of using email interviews have been identified from previous research, like interviewees are free to respond in their own time and space without being constrained by time frames, unlike a face-to-face interview. E-mail interviews allow participants to construct their own experiences with their own dialogue and interactions, as well as the responses are more thought out before they are sent. This will ensure the quality of data obtained from the session (Meho, 2006). However, e-mail interviews also have several limitations. Bampton & Cowton (2002) said that e-mail interviews provide a limited register for communication and are dependent on willing and competent access to reliable technology on the part of both researcher and subject. Besides, if the interviewees were lacking in computer proficiency or could not give commitment, this will cause a delay to respond and give feedback, and the interview process will be stalled and disrupted. The worse part of this is that participants will silently leave and drop-out of the session without telling the interviewer (Meho, 2006).

The email-based interview could be a "semi-structured" interview or a "structured" interview depending on how the interview is being conducted (Bampton & Cowton, 2002; Gibson, 2010). For this study, I claim that this interview is a "semi-structured" interview due to several enquiry-response processes conducted over the interview period. Even though the first email contained a fixed question, I managed to identify the lack of data in certain emails and issued further enquiries with additional questions to gain more explanation from the respondents. As mentioned by Gill, Stewart, Treasure, & Chadwick (2008) that a researcher should select the appropriate technique by considering the facilities of both researcher and respondents, the research duration, the culture of the respondents

and the agreement of the participants, I think this semi-structured interview is suitable in the context of Malaysian students and employees.

Consequently, as a researcher, I decided to choose the email-based interview because of a few factors such as the long distance between me and the respondents, the established Internet facilities in Malaysia yield the higher possibilities of email availability. These email-based interviews also had been requested by the respondents and they gave approval to conduct this type of interview. In addition, I felt that it was convenient to communicate through email with the respondents due to not being bound by limited time, which always happens in a face-to-face interview where time and availability are the most challenging issues. By using this method, I could email participants at night, early in the morning or even on public holidays. The same goes for the respondents: they could freely reply whenever they felt comfortable, but within the given time duration (in my case four weeks' time was given). This situation was reflected from my experience as a private sector employer who was always busy with an abundance of work during daytime, 9am to 5pm, and only had ample time during the weekend. So I had to understand the situation of the respondents and not add more pressure to them. Besides, from my observation, I knew that the Malaysian attitude was typically characterised by the "shy" and "awkward" culture, especially in the face-to-face situation. Therefore, I made up my mind to use this electronic technique that could "hide" their appearance and only seek their notes and narration via email.

Therefore, by referring to Meho's (2006) suggestion and to ensure that the interviews would achieve the research goal, initial steps including the following were taken into consideration:

   i.   Interview request: The request was stated succinctly and professionally. The documents like ethical approval were sent out to obtain the trust and confidence of the interviewees.

   ii. Subject line: An effective subject line for the first contact was used. This was to ensure that they would open the email without deleting it before reading it.

iii.   Self-disclosure: Self-introduction was followed by a letter of support from the Director of studies.

iv.   Be open about the research: The main themes were briefly explained. While the details of the project were outlined, participants were welcome to give their opinion about other issues associated with the themes.

v.   Interview questions: As the interviews were not face-to-face sessions, the questions were constructed with long explanations and a few examples were provided. But, if the respondents did not understand something, they could email back to obtain clarification.

vi.   Instructions: Along with the interview questions, the instructions to the participants on completing the interviews as well as the trial version of the E-portfolio were included.

vii.   Deadlines and reminders: The respondents were given a maximum of four weeks to complete the interview schedule. However, a friendly reminder was sent out on the 3rd and 4th weeks.

viii.   Participants and data quality: The participants were selected by their superior. Therefore, the people involved are the correct ones to answer the questions. Data obtained were analysed and several follow-up emails were conducted due to misunderstanding or lack of answers gained to the questions. Ultimately, all interviewees were satisfied with their answers, even though the time duration extended up to eight weeks.

As mentioned earlier, the approach to use e-mail interviews in this study was decided after pre-discussion with respective officers in the Ministry. Based on the discussion, they requested a few conditions to facilitate the interviews, such as the response time period should be between two and four weeks and the interview questions should be in a semi-structured schedule. They agreed to be interviewed through e-mail rather than face-to-face interviews via an online application such as Skype. They confirmed that they had the facilities to access the Internet and affirmed to use the official department e-mail for the interviews. On the other hand, participants from the three Skills Training Institutes also avowed that they had no difficulty responding to the interview questions through email.

This is because a relatively long period of time was given, as well as a friendly reminder being sent before the expiry of the session.

For this study, similarly with the survey, the interviews were also conducted in two sessions: the interview during the early study to obtain the perception of stakeholders regarding the suggestion of E-portfolio implementation in the Skills Training Program, and the evaluation interview, which was conducted one to two months after system execution. Both interviews were conducted via formal electronic mail communication.

Upon receiving the response for the first session, a few further emails were sent to the respective respondents due to unclear answers or insufficient information. The process of send-resend took approximately two months, which was a bit longer than the planned timeframe. However, as the objective of the interview was to gather more information and rich data, this additional time had been anticipated.

The perception interviews were scheduled through e-mail from 29th June 2012 until 30th October 2012 involving 10 respondents, who were the government officers, principals and the instructors. The evaluation interviews were conducted around August-October on 2013 and 2014 with 28 respondents: students, mentors, instructors and the principal.

A sample of interview transcript can be found in the Appendix 11.

4.5.1.4 Social Network Data Collection

In recent years, the large quantities of online social network services have enabled Internet users to share their activities, photos and opinions on popular phenomena. This latest form of social involvement has attracted much research aimed at understanding the users' behaviour. The data collection methods for this type of environment can be executed through different ways, such as (Abdesslem, Parris, & Henderson, 2012):

    a. A survey – by asking the participants directly about their behaviour using personal messaging, Inbox messaging, private or public discussion

b. Data shared on social network websites – for instance, on Facebook: data like posted comments or participant's own posting could be useful data to explore the behaviour of the user.

c. Through deployed application – by directly monitoring users as they share content online.

These technique of data collection might have advantages as well as drawbacks that need to be taken into account. As many countries now have established Internet facilities all over the place, the respondent rates to feedback to the research are quite promising (Ortigosa, Martín, & Carro, 2013). However, the essential parts like user privacy and confidentiality, data reliability and user engagement of the system are the most challenging parts and are not to be ignored (Kabilan, Ahmad, & Abidin, 2010). In this research, I adopted a few techniques for data collection using the Facebook website, such as posting and instant messaging. The explanation of these techniques can be found in the next section.

4.5.1.5 Online Data Collection

a. Facebook Postings

Facebook is one of the most popular social networking sites due to the development of Internet facilities in most countries all over the world. People are able to gather information to cater to their interest in many aspects like places, peoples, events, hobbies and many more. The majority of teenagers, students or even professionals have their own Facebook pages specifically created to represent themselves in the virtual public (Ortigosa et al., 2013).

In Malaysia, 12.23 million Facebook users were recorded by Malaysia Facebook Statistics 2012, which is 72 percent of the country's online population. This was ranked 17th in the world in terms of Facebook usage. This phenomenon is supported by various authors (Danyaro et al., 2010; Jalil et al., 2010; Kabilan et al., 2010). For instance, half the number of Malaysian tertiary level learners use Facebook more than any other

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social network website (Jalil et al., 2010) due to the distinctive functions and application offered such as 'group', 'friend', 'pages', 'photos' and many more. Therefore, these features are believed to facilitate the users to stay connected and to update events for social and professional purposes (Danyaro et al., 2010). Moreover, Facebook pages have also been perceived as a medium to enhance English language proficiency and communication strategies by reading people's postings, stories and even links that connect to useful websites (Kabilan et al., 2010; Omar, Embi, & Yunus, 2012). Despite the drawbacks such as the privacy leaking, the bad influence of uncensored pages and time wasted looking at unnecessary material, these downsides could be controlled by the user her/himself and by third-party monitoring such as by parents. Therefore, Facebook's benefits are still undeniable.

Therefore, for this study, I created a special E-portfolio account that I personally administered. The account was named "*Penyelidik E-portfolio*" (E-portfolio Researcher) and only contains sources of E-portfolio application such as video, manual and links to E-portfolio-related sites. Questions or statements posted on the page that received comments were taken as data for this project. The ethical issues like privacy, confidentiality, anonymity and data usage were disseminated through the page. All participants were invited and became 'friends' with the researcher's official page. This account has 87 friends, including instructors and students. Two postings with the question "*What do you think about the E-portfolio?*" were issued in 2013 and 2014. Twenty-six comments were received and compiled for analysis. After the project duration was completed, the students and instructor were informed to "unfriend" the E-portfolio Researcher's account if they preferred to do so. The postings related to data collection also were hidden to avoid any protracted issues. However, the E-portfolio Researcher's account is still available to act as a medium for any E-portfolio users to inquire or gather information related to the E-portfolio application. Refer to Chapter 5 for further explanation regarding the data.

b. Online messaging – Semi structured Interviews

According to Stieger, Ph, Göritz, & Ph (2006), instant online messaging can be considered as an Internet-based service that lends itself to be used to conduct online interviews. This type of service could support the exchange of text messages, spoken language and also disseminating files. As proven by Dimond, Fiesler, Disalvo, Pelc, & Bruckman (2004) in their study on comparing interviews using instant messaging, email and phone, even though using a phone will show a higher word count than messaging or email, the quality of the data may be lower due to repetition of words, and also using a phone is not so cost-efficient due to phone bills. Conversation via instant messaging seems to produce more unique and spontaneous ideas which lead to the richness of quality input data. The process of transcription and data handling also could be minimised and simplified so it definitely contributes to time saving. However, despite the other benefits that have been highlighted by previous studies, like the data persistence of the conversation and speeding up the respondent feedback and response, this type of conversation also might face a few disadvantages such as struggling to maintain the focus or attention of the respondent. The respondent might be communicating with other acquaintances while doing the interview or might do something else like browsing web pages, watching videos or listening to music (Voida, Mynatt, Tech, Erickson, & Kellogg, 2004) . The issues like reliability and validity of the user could be questioned as the interviewer cannot see the respondent face-to-face during the process.

Therefore, after considering the pros and cons of this type of interviewing method, this study chose to apply an online communication using the Facebook application for the online interview session. The interviews employed semi-structured questions where I determined the questions before the session but still allowed for additional spontaneous questions in order to gather more data and responses. As mentioned by Bampton & Cowton (2002), semi-structured interviews could enhance the richness of data if properly conducted, even without being face-to-face with the respondent, if the precautions and appropriate setting have been deployed accordingly.

The purposes of using online messaging for this research are as follows:

    i.   To act as technical assistance during the project cycle.

    ii.   To obtain quick feedback on certain issues such as security, log-in problems or other technical or deployment process failure.

    iii.   To create good bonding and relationships with the participants so that they could honestly complain if they have any dissatisfaction with the system.

    iv.   To obtain the users' opinions and views during and after the system's deployment.

The precautions taken to ensure the interview produced valid and reliable data are as follows:

    i.   I set a suitable time with the respondent to conduct the conversation within break hours on the campus. This is to reduce time wasting due to unavailability of either party.

    ii.   The conversation used the respondent's Facebook page so it ensured that the student was the authentic one.

A sample of personal instant messaging and the conversation extracted from the Facebook posting can be found in the Appendix 12 and 13.

4.6   Summary of Data Collection Methods

Data on the learning outcomes of this E-portfolio study were generated by online participant observation, assessment rubrics, questionnaires, interviews and online communication. As mentioned earlier, quantitative methods like rubrics and questionnaires are important to measure the students' engagement with, and acceptance of, the E-portfolio and to evaluate the E-portfolio process adopting KEL theory and CBT approach. Besides, the data are useful to show the degree of difference or relationship between variables, demographic details and others.

On the other hand, the qualitative data-gathering tools such as survey, interview and online communication were conducted to obtain subjective information including perceptions,

behaviours, emotions, feelings and to investigate the internal and external factors that might influence the deployment of the system, as noted by Strauss & Corbin (1998) where "*qualitative methods can be used to obtain the intricate details about phenomena such as feelings, thought processes, and emotions that are difficult to extract or learn about through more conventional methods*" (p. 11).

The quantitative and qualitative data that will be collected in this research are summarised in the following Table.

Table 4.5 Summary of Data-Collection Methods

Methods	Technique	Item	Purpose
Quantitative	Document Analysis	E-portfolio Application Rubrics	To find the scores differences of Modules that employed the E-portfolio and vice versa.
Quanti + Quali	Survey (Likert Scale and Free text)	Questionnaires	1. To obtain perception of students about the EE-portfolio. 2. To identify the dimensions of KELand CBT that influence the usage of the E-portfolio. 3. To investigate the agreement of participants with each dimension
Qualitative	Interview	Structured and Semi-structured Interview Schedule through Facebook communication and electronic mail Facebook Posting	To obtain opinions on the system's application from the target participants during: 1. Early study – before implementation 2. System Evaluation – after implementation To obtain current users' experience while using the system. To explore users' experience after using the system.

Source: Self-Study

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4.7 Population and sampling in the study

The researcher adopted a purposive sampling method to identify the target group of participants. Purposive sampling is one of the sampling methods available where the samples are likely to be chosen in a deliberate manner in order to increase the chance of getting the most relevant and plentiful data in an area of study (Yin, 2011). The population is trainees from Level 3 Certificates and Level 4 Diploma Skills in MSTP under the Department of Skills Development (DSD), Ministry of Human Resource, Malaysia. There is a gross average of 600 active trainees in Levels 3 and 4 per year all over Malaysia, based on statistics from the DSD dated 15th January 2012 (Dollah et al., 2012). But, as suggested by the DSD, this research will focus on a group of students from an established institution which is rated at 4 to 5 stars by the department. The DSD also suggested that this research focus on one or two skills training institutions as the trial centres. This condition is also supported by Cooper (1982) where he suggested that the target samples of the study should be chosen among the accessible population that has similar characteristics to the general population . The admission qualifications and the structure of programme in the MSTP is uniform in all institutions, thus the participation of one institution is sufficient.

Therefore, this research approached one private skills institution that had been rated as 4-Star by the DSD in 2012. The institution was based in Kuantan, Pahang, Malaysia. At first, this study intended to focus only on the participants from Diploma courses (Level 4) because they were expected to be more mature and experienced than lower-level students. However, as the responses and feedback were unsatisfactory, the study opened participation to Level 3 and above with ages ranging between 18 and 24. The decision not to include "freshers" in the selection of participants, was taken because in the MSTP, most of the early registered students were experiencing literacy problems and were still in the process of adjusting themselves to their new environment (Abd Aziz & Haron, 2012; Jamil & Mat Som, 2011; Zulkefli et al., 2012).

The total number of students on Level 3 and Level 4 for all courses in this institution were 167 students in 2013 and 154 students in 2014. The research was supposed to take samples in the range of 70 trainees and seven trainers to implement the system in a one-year cohort as well as to participate in a questionnaire session based on determination of sample size tables by Krejcie & Morgan (1970). However, the number of participants that accepted the invitation decreased because one-third of them left the campus for industrial training for six months. Therefore, for 2013 only 39 students agreed to take part in the project and 55 students in the 2014 cohort. The instructors involved were trainers of the respective groups for both years.

The participants were selected from a variety of courses. After getting the student and instructor list and email addresses, the ethics documents were emailed with brief information with regard to the tasks and responsibilities of each participant. The consent documents were collected through email three weeks after the invitation email was sent out. Tables 4.6 and 4.7 below show the summary of participants who voluntarily agreed to join this project.

Table 4.6 Summary of Participants (Students) for 2013 and 2014 cohort

Year of Cohort	Group	No. Of Participants	Assessment Type	Project Duration
2013	Computer System L3	12	Special Project	11/02/2013-11/04/2013
	Kitchen Practise L4	19	Special Project	1/03/2013-28/5/2013
	Woman Dressmaker L3	8	Special Project	22/4/2013-17/6/2013
	TOTAL COHORT 2013	39		
2014	Computer System L4	26	Special Project	4/3/2014-29/6/2014
	Woman Dressmaker L3	5	Special Project	3/2/2014- 16/5/2014
	Plantation L3	9	Special Project	7/4/2014 – 7/7/2014
	Electrician L3	15	Special Project	3/2/2014 – 25/4/2014
	TOTAL COHORT 2014	55		
	TOTAL STUDENTS INVOLVED	94		

Source: Self-Study

Table 4.7 Summary of Participants (Instructor/teacher) for 2013 and 2014 cohort

Year of Cohort	Group	No. Of Participants	Assessment assessed	Project Duration
2013	Computer System L3	1	Special Project	11/02/2013-11/04/2013
	Kitchen Practise L4	1	Special Project	1/03/2013-28/5/2013
	Woman Dressmaker L3	1	Special Project	22/4/2013-17/6/2013
	TOTAL COHORT 2013	3		
2014	Computer System L4	3	Special Project	4/3/2014-29/6/2014
	Woman Dressmaker L3	1	Special Project	3/2/2014- 16/5/2014
	Plantation L3	1	Special Project	7/4/2014 – 7/7/2014
	Electrician L3	1	Special Project	3/2/2014 – 25/4/2014
	TOTAL COHORT 2014	6		
	TOTAL TEACHERS INVOLVED	9		

Source: Self-Study

However, Tables 4.6 and 4.7 above show the initial student engagement at the start of the project cycle. The numbers were reduced when collecting data because only 58% to 69% of the students successfully finished the task given and completed the end of the process. The number of completed participants are discussed in details in Chapter 5.

4.8   Ethical Considerations

In educational research that involves humans as participants, several issues need to be taken into consideration before commencing any work or study. The ethical principles as outlined by the British Education Research Association (BERA) recognise five important points: minimising harm, respecting autonomy, protecting privacy, offering reciprocity and treating people equitably (Hammersley & Traianou, 2012), which need to be concerned in any educational research. However, the interpretation of these five principles may be different among researchers depending on their culture, environment and field of study. For example, in "minimising harm", "harm" could be defined in various ways depending on the situation and research environment. In medical studies, harm possibly means damaging people's health while in behavioural research, harm may include psychological feeling, distress or depression. Therefore, it is the responsibility of the researcher to explicitly inform the participants about their involvement in the study without hiding any truth. The participant should "fully" understand the risk, contribution to be made and how long it will take to engage with the study. Even the word "fully" here is subjective (Hammersley & Traianou, 2012), as we do not know how far participants can totally comprehend the information; however, this is not a reason to avoid telling them the reality of the research.

In this study, as the participants were involved with the computer application and in deploying tools like a digital camera, the risks expected to be experienced by the participants were minimal. However, I cannot deny that there are possible risks for the computer user, as informed in the Lasa Information System Team (2010), where computer users may experience musculoskeletal problems and eye strain due to unergonomic seating or improper peripheral setting and over-exposure to the computer screen. In terms of the psychological aspects, this research may also contribute to mental stress due to participants struggling to learn a new thing and deploying a new application which seems difficult, especially to non-IT students and instructors.

Other than that, issues like privacy and confidentiality as well as anonymity were clearly conveyed, particularly in the Facebook context. As Ortigosa, Martín, & Carro (2013) mentioned the possibility of a researcher experiencing bias when dealing with a student's Facebook account, I kept reminding myself not to explore the participant's account and not to respond or comment on whatever posting or sentiment they initiated if it was not related to the study area. The participants were also always reminded to exclude me from their social sharing. Thus, in the Participant Information Sheet, all these possible risks and issues were explained as well as the voluntary aspect, which is one of the most important matters in any social research in order to defend the participants' right (Hammersley & Traianou, 2012) to choose whether to agree or not to be included in the study. In this study, the participants (students and instructors) involved were over 18 years old, so parental consent was unnecessary. Consent was requested only from the principals, students and instructors. Consent was also obtained from the Department of Skills Development, Ministry of Human Resource, due to the involvement of the government officers during the preliminary study.

After reading and understanding the requirements of ethical approval for this research, I lodged the first ethical application on May 2012 to the Research Ethics Committee, Liverpool John Moores University. The original ethical approval was obtained for this research on 12th June 2012 with the LJMU Research Ethics Committee (REC) Reference number: **12/ECL/010 The Development and Evaluation of E-portfolio application in Competency-Based-Training, Malaysian Skills Certification Diploma**. The research was approved to be conducted from 12/06/2012 to 12/06/2016.

However, due to a few changes made after being reviewed with the supervisory team, the researcher twice requested amendment of approval. The changes were to increase the duration of data collection and add more data-collection methods. The participants were provided with a complete information sheet, consent form and all related documents. To ensure the understanding of each participant, every time a communication was initiated, I gave the introduction that contains information about anonymity and confidentiality as well the voluntary aspect regulated within this study.

Consent was also obtained from the Department of Skills Development, Ministry of Human Resource, Malaysia and the principal of the Skills Training Institute where this research was executed. After sending the consent application through Gatekeeper Form, both organisations sent an email and a formal letter confirming the permission for this research to be implemented. These email and letter can be found in Appendix 5 and 6 , while the related ethical documents can be found in the Appendix 7.

4.9   Data Analysis and Validation

Analysis of Quantitative Data

To analyse the data, I deployed a few statistical methods that suited the nature of the data and the aims of the study. For the rubrics, the percentage-based calculation was implemented to find the difference between pre and post deployment of the system in each course and year. The analysis started with finding the average of scores in two modules that use E-portfolio. Then, the percentages of scores on pre and post deployment were calculated using Microsoft Excel 2010. The differences were mapped into graphs and variances between courses were observed.

For the survey in the preliminary study, the analysis was mostly conducted using Microsoft Excel 2010 to obtain percentages of each item of data for each question. While, for the survey questionnaire, to accomplish the research objectives for this project and answer the research questions, I employed four analysis techniques to analyse the data: Descriptive statistics, the median analysis, Kruskal-Wallis test and the Spearman Rho's correlation. The Descriptive analysis produced the frequencies where the percentages of respondents' courses and gender were measured. Besides, the values of skewness and kurtosis were also checked to ensure the data normality of distribution. Skewness and kurtosis values are two basic methods for determining the normality of a distribution. A z-test is applied for normality test using the skewness and kurtosis values. A z-score could be obtained by dividing the skew values or excess kurtosis by their standard errors. For small samples ($n <$ 50), if absolute z-scores for either skewness or kurtosis are larger than 1.96, which corresponds with alpha level 0.05, then it can be concluded that the distribution of the

sample is non-normal (West, Finch, & Curran, 1995). From these analysis, few of the variables were skewed , so the distribution of the data can be claimed as not normal. Further details of this analysis are explained in Chapter 5.

Next, due to the condition of not normally distributed data, the Kruskal Wallis test was applied to find the significant differences between courses and year on essential themes of the E-portfolio process. Prior to that, the median scores showed the degree of evaluation of the E-portfolio process implementation. It is to measure the main research objectives of making E-portfolio process in the MSTP useful is successful or vice versa. As Sekaran (2003) mentioned in his book, the analysis of mean, median and the variance in data could provide ideas for the researcher to evaluate the respondents' scores yielding to further analysis need to be made in order to achieve the research target. The Spearman Rho's correlation analysis was done to measure the relation between selected important factors where the result was part of the main aim of this project. The statistical analysis was conducted using the SPSS application and Microsoft Excel 2010.

Analysis of Qualitative Data

Meanwhile, for the qualitative data such as email interviews, personal communication, group discussion and Facebook postings, all these communications were transcribed using Microsoft Word 2010 and were translated into English. I asked two TESL (Teaching English as Second Language) teachers in Malaysia to carry out the validation of the translation to ensure the authenticity of the meaning. Then, the transcriptions underwent a continuous process of skimming, reading and interpreting. I applied deductic approach with thematic analysis which is permissible when research has pre-determined objectives that need to be investigated and explored (Creswell & Clark, 2011; Namey et al., 2007; Ritchie & Spencer, 2004; Teddlie & Tashakkori, 2010). With the basic pre-determined themes such as E-portfolio purpose, E-portfolio benefits, E-portfolio process, E-portfolio success factors and E-portfolio challenges, I deployed the 'Framework' analytical tool developed by the National Centre for Social Research in the 1980s (Ritchie & Spencer, 1994). With this tool, the researcher may still thoroughly read the data prior to analysis, but his or her analysis categories have been determined a priori, without consideration of the data

(Namey et al., 2007). I prefer to use paper-based analysis or traditional analysis rather than using software which is now available for qualitative analysis such as Nvivo or Atlas.ti because I feel that having raw data on paper is much more comprehensible and meets with my personal satisfaction. Even so, the process was very challenging especially the coding, labelling and tagging. I fetl very close to the data when I handled it on paper. In addition, even the software does not 'analyze' the data. It only helps the researcher to manage the data and make handling the data easier. The 'analysis' process still remains the task of the researcher (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008). Thus, I chose to process the qualitative data with the traditional method and by using the deductive approach. According to Beiske (2002), the deductive approach is applicable when a researcher wants to explore known theories or phenomena as well as to evaluate whether a theory is valid in a certain situation. The researcher is allowed to pre-determined themes based on the features or charateristics of the known theories. By comprehending the two theories that were adopted, the deductive approach helped me to determine the target keywords that needed to be explored and discovered.

In this research, the KEL and CBT theories were guidelines to determine the keywords prior to the analysis. A brief explanation of this analysis is presented in Chapter 5 - Research Activities and Findings. However, this technique seems to have issues with reliability, where the researcher is inclined to put data into unsuitable themes or misinterpret the original meaning, thus wrongly placing the data. Therefore, the strategy to increase the reliability by conducting the report-and-respond techniques at the end of the process was implemented accordingly. For further detail on the validation of reliability, refer to the section Validation of Findings.

Triangulation of data

Data from both the quantitative and qualitative methods went through a process of triangulation to seek conformance and divergences. As described earlier, this approach is one of the reasons why I chose to deploy the mixed methods research for the process of collecting and analysing the data. The triangulation amalgamates both quantitative data and qualitative data where, in the quantitative methods, the features of learning theories

adopted in the theme 'E-portfolio process' were being investigated. Meanwhile the qualitative methods then search through the data for evidence that is consistent with or disconfirms these themes (Creswell & Clark, 2011) as well as to find other emerging evidence. Denzin (1978) identifies two types of methodological triangulation – 'within-method' and 'between' or 'across' method. A study using the 'within-method' approach is confined to one method, but uses different strategies within it. Much more suitable, in Denzin's opinion, is the 'between' or 'across methods' approach which, by combining at least two different methods in one study, earns the benefits of each approach while also compensating for their weaknesses.

In this research, the triangulation of methods involves both the "within-method" and "across-methods" approach (see Figure 4.3 for further details). Through this technique, all sources of data were mapped with the aims of finding the information based on pre-determined themes and also to explore any emerging findings. The quantitative part contributes more to E-portfolio process deployment, which contains features from the learning theories adopted. The qualitative data were reviewed to support this theme as well as to provide other emerging findings. Besides that, information under the themes such as benefits, issues and success factors were also being revealed from both methods. After completing the merging process, the final conclusion was obtained and laid out in draft format for the validation process.

The further implementation of data combination based on these triangulations is explained in Chapter 6 – Research Findings and Discussion.
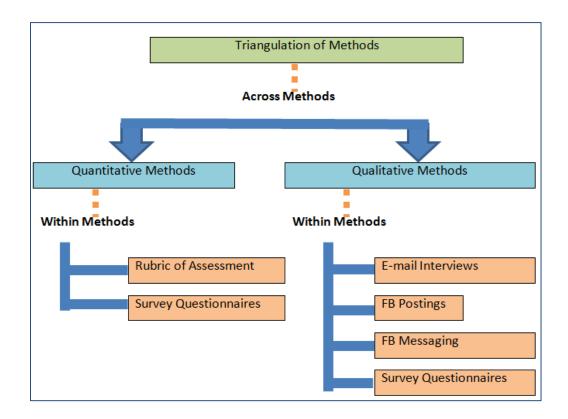
Figure 4.3 The triangulation approach underpinning the data analysis

Validation of Findings

One major problem with the semi-structured and unstructured data-collection techniques common to all qualitative research is that the researcher's bias towards her/his own theories and perceptions may distort the data, especially where there are small numbers of respondents; the phenomena can get distorted by their own bias (Creswell, 2003; Crotty, 1998). Sarantakos (1994, p 76) illustrated some concepts associated with validation in qualitative research, such as "cumulative validation", where the findings are supported by other studies, "communicative validation", where the findings are evaluated by the respondents, "argumentative validation", where the conclusion should be followed and tested, and finally " ecological validation", which involves stable methods and takes into consideration the life and condition of the research. Most data from this study were obtained from the qualitative part; therefore, the necessity of checking how accurately participants' realities have been represented in the final account should be accounted (Creswell & Miller, 2010).

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Hence, to improve the validity of outputs of the study, I adopted a respondent validation-based approach (Sarantakos, 1994; Sitko, 2013; Stronach & MacLure, 1997) called the report-and-respond enquiry technique, where the main findings that had been analysed and structured were sent back to the respondents to ask for verification and comments. This process is also known as member checking (Creswell & Miller, 2010) and is a means of enhancing the validity of the data (Krefting, 1991). The selection of this approach was motivated from the Sarantakos (1994) concept where he outlined communicative validation: validation of findings by the research participants can be employed to validate the qualitative data in social research. Other than that, this type of approach is also inspired from the view of Stronach & MacLure (1997) where they see the enquiry process at once combining all sources of data would provide a wider validity of findings and could engage the respondents more actively and differently (positive, negative or neutral) when commenting on the report, resulting in more data accuracy and reliability. Moreover, the respondent validation also offers advantages such as it helps to recognise my own bias and misunderstanding of the data, its effective at ruling out possible misinterpretation of events and meaning, and could systematically solicit feedback about the data and conclusion from the study population (Sitko, 2013).

Consequently, in this study, through this technique, an enquiry containing the findings report was sent out via e-mail to selected respondents, who were students, mentors, instructors and principal. This report consists of statements that resulted from the data analysis of both quantitative and qualitative methods. The chosen respondents were asked to state their agreement or disagreement by commenting in the space provided. After the responses were received, over a four-week period, the documents were compiled and analysed. The statements that received majority agreement were declared as validated and became entries in the thesis. Part of the validated statements and quotes can be found in Chapter 6- Research Findings and Discussion.

4.10   Data-collection challenges

Social research offers great prospects that lead to the understanding of a phenomenon, society, behaviour and emotion. This is because social research deals with humans and

community rather than a machine or equipment. However, as the nature of human beings possesses thousands of vagaries, this could lead to problems and become a challenge for the researcher. Besides, there were also a few external factors that contributed to the delaying of the research process, which are explained further below:

i. In order to obtain the consent from both organisations (the Department of Skills Development and the institution), I had to wait for two to three months to get the official approval. It was the organisation's policy to ask for superiors' consent before making any decision; hence, the process of hearing and approval depended on the availability of the board of directors and respective personnel.

ii. Getting participants for the research was the major challenge in this study. A few introductory emails and telephone calls were required to confirm the groups, instructors and students that might be interested in the project. During the project duration, the number of participants who dropped out made me uneasy. This was because a reduced number of participants would totally affect the amount of data collected in questionnaires, rubrics and interview sessions.

iii. To set up a suitable time with the respondents was quite a challenge due to the difference in time zones between the UK and Malaysia (seven to eight hours). I had to stay awake in the early morning to match the Malaysia time at noon. To cater for this problem, appointments were made one to two days prior to the interview sessions. However, sometimes the respondents failed to make a commitment due to inevitable matters arising.

iv. To obtain responses from email interviews was a very time-consuming process. Approximately two to three months were spent completing the data for two to three respondents, including the re-send and inquiry processes. A friendly reminder was regularly sent to remind them about the interview document. Facebook communication was also utilised to communicate with the interviewees about the email response.

v. To secure the privacy and confidentiality of the participants, every time a conversation was initiated, the researcher repeatedly reminded them about the Facebook account, the voluntary scheme, the anonymity and the use of data to be inserted in the research findings. Some students were not aware of this (not reading the Participant Information

Sheet thoroughly) and kept asking about the effect of their participation in the project. This conversation took longer than expected. However, as this research involves students who have learning difficulties in some areas, this situation is understandable and acceptable, as long as they really put effort into cooperating throughout the project.

4.11   Summary

This chapter explains about the research methodologies that currently exist in the world of research and the methods that have been chosen for this research. The mixed methods approach was adopted as supported by the pragmatist view, where both quantitative and qualitative techniques are allowed in order to achieve the research goal. The data collection methods employed included the online survey questionnaire, evaluation rubrics, email interviews and online communication.

This chapter has also elaborated the challenges and constraints that intervened during the data-collection process. However, with the spirit of learning and researching, the collection of data was successfully completed, even though it took longer than estimated. The details regarding the results and findings of each method are presented in Chapter 6- Research Analysis and Discussion.

CHAPTER 5

RESEARCH ACTIVITIES & DATA ANALYSIS

5.1   Introduction

In this chapter, I will explain chronologically the research activities that have been conducted during the study and the finding of each activity. This project consists of two phases, the preliminary study and the main study. The preliminary study was aimed at obtaining preliminary views regarding whether this application should be carried out in the skill training education institutions. This initial study also act as a determinant to continue with the next phase, depending on the results obtained. The second phase is the main study where the actual deployment of the E-portfolio system was executed. The deployment involved the trainers and students from the courses on computer systems, kitchen practice and dressmaking for 2013 and in addition plantation and electrician courses for the 2014 cohort.

In each phase, data were collected in a variety of ways, as this study applied qualitative and quantitative research methods. The qualitative data were collected from interviews via personal messaging, email, Facebook posts and survey. Meanwhile, the quantitative data

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were gained from the assessment rubrics and surveys on perception in the early study and the evaluation survey at the end of each year.

To enhance understanding, in this chapter I present the sequence of activities executed. The results obtained from each activity will be explained consecutively, where I took the approach of using the findings of each activity to be a guideline to plan and implement the next activity. There are four parts to this chapter: Part I: The Preliminary Study, Part II: The Research Activities, Part III: The Quantitative Analysis and finally Part IV: The Qualitative Analysis. The results of these analyses will be compared and contrasted to discover the emerging findings. This process is explained in the next chapter along with the research discussion.

This chapter contains tables and figures to illustrate the findings. Unless otherwise stated, all figures and tables are my own work.

5.2 PART I: The Preliminary/Pilot Study: The perception study of stakeholders towards the use of E-portfolio in the Malaysian Skills Training Programme (MSTP)

5.2.1 Rationale for conducting the pilot study

I took the decision to implement a pilot study prior to the implementation of the E-portfolio system because I wanted to seek views and opinions from the stakeholders in the MSTP. I wanted to explore the existing e-learning system that had been introduced in the programme and how far they perceived this system had the potential to be implemented in the programme . As far as I was aware, taking into account my 12 years' experience in the skills training and education field, no e-learning system had ever been used by a skills training institution. However, I needed to confirm these facts with a few important people, especially the officers of the Ministry of Human Resources, which regulates the skills training education policies and curricula in Malaysia. Following the requirements of the study, the initial investigation was conducted to identify requests, needs and requirements of the relevant people involved in this programme.

During the preliminary study phase, two areas of activity were undertaken. At first, interviews with officers, principals and instructors of the MSTP were conducted. Secondly, a survey questionnaire on students' perceptions and views regarding the implementation of the electronic portfolio was executed with the students on the skills training programme. Thus, the research questions investigated through the implementation of this preliminary study are listed in Table 5.1 below.

Table 5.1 The Preliminary Research Objectives

No	The preliminary study aims	Methods
1	What is the current status of the Skills Training Programme related to previous, present or future developments in E-learning?	Interviews with Officers, Instructors and Principals of the Skills Training Programme
2	What are the participants' perceptions regarding whether an E-learning or E-portfolio should be implemented in the Skills Training Programme?	Survey questionnaires to 70 multi-course students on the MSTP
3	What are the anticipated advantages and constraints of implementing E-learning in the Skills Training Programme?	Both Interviews and Survey

5.2.2 Interviews with Officers, Principals, and Instructors

The interviews were scheduled through e-mail from 29th June 2012 until 30th October 2012 and involved 10 respondents, the relevant government officers, principals, and instructors. The details of the respondents are as follows:

i. Five (5) senior officers from the Department of Skills Development, Ministry of Human Resources, Malaysia.

ii. Two (2) managers of a Private Accredited Centre that runs the Malaysian Skills Training Programme under the Department of Skills Development.

iii. Three (3) instructors cum verifier officers of an Accredited Centre that taught the Skills Training Programme (two were from private institutions, and one was from a Public/Government Institution).

The questions raised in the interviews related to the status of the skills training accredited centre and the Ministry itself in introducing the e-learning technology in the programme. Other than that, questions prompted participants to provide their views on e-learning that should be implemented and the potential of the system in the skills training sectors. The respondents were also asked about the anticipated benefits and challenges that might occur due to the implementation. The findings of these interviews are explained in the section 5.2.4.

5.2.3   Survey Questionnaire

The survey questionnaire was conducted online using the "LimeSurvey" application. The survey was self-administered using online monitoring facilities. The invitation was made through email to 150 students in an accredited skills training centre in Pahang; they were provided with the survey link and the participant information sheet and consent form. It took about four months for 70 surveys to be completed.

The questionnaire contained 10 questions, which comprised a variety of formats. The details of the questions are as follows:

Table 5.2 The format of questions in the perception survey questionnaire

No	Questions	Format
1	The understanding of e-learning	Multi-answers
2	The initial perception of the E-portfolio	Multi-answers

3	The experience of using any e-learning technology	Yes/No
4	Whether it is necessary for the E-portfolio to be introduced into the Skills Training Programme	5 Likert Scale (Very necessary to Unnecessary)
5	Whether the E-portfolio will be implemented in their institution	5 Likert Scale (Strongly Agree to Disagree)
6	The suitable users of the E-portfolio in the Skill Training Programme	Multi-answers
7	General views of the E-portfolio (benefits, challenges)	Multi-answers
8	Factors that could contribute to the success of the E-portfolio implementation	Ranked the factors given
9	If the E-portfolio could enhance the performance of teaching and learning in the Skills Training programme	Multi-choice (Yes, Maybe Yes, No, Unsure)
10	Their expectation regarding the E-portfolio's implementation	Multi-answers

Figure 5.1 provide snapshots of the online survey from the website of the Malay language version. The results of this survey are explained in the next section.

Figure 5.1 Questions on the first page (Malay version)

5.2.4 Findings of the Preliminary Study

The results presented are organized into key themes that emerged from the analysis of data gathered from the survey questionnaire to students and e-mail interviews with stakeholders.

The 10 transcriptions from the interviews with the 10 respondents were analysed within a month of receiving the entire transcripts. *A- priori* codes based on the literature review themes and research questions for the study were developed. These are represented in these findings with a summary of the responses from participants including representative quotes. Meanwhile, the data from the survey were analysed based on results from the 70 student participants, and each theme was analysed on a percentage basis.

There were three main themes with 11 subthemes discovered from the data. The main themes are the perception of E-learning and E-portfolio, the benefits anticipated from the E-portfolio, and the issues and constraints that might be faced due to E-portfolio

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implementation. The section below contains more detailed information about the findings of this preliminary study.

Theme 1: Perception of E-learning and E-portfolio

Virtual Learning Environment (VLE) is defined as a computer-based environment, also referred to as electronic learning (E-learning), allowing interaction and relationships with other participants (Freitas & Mayes, 2004). Electronic Portfolio (E-portfolio), which is part of the VLE method, is proposed for implementation in the MSTP. E-portfolio is defined as a collection of digital artefacts or work products, including the evidence of learning, demonstrations, resources, and accomplishments of individuals, groups, communities, organisations, or institutions (Barrett, 2005; Smallwood et al., 2007). In this theme, three subthemes were discovered: the perception of respondents concerning the E-portfolio definition and function, the anticipation regarding the designed E-portfolio and the important key factors that should be taken into account when developing an E-portfolio for MSTP.

a. *E-portfolio definition and function*

From the survey data, it was confirmed that only 34% of the students had used any kind of e-learning system, whilst the other 66% had never been introduced to one. But, despite having no idea what E-portfolio is, they were still able to imagine the definition and purpose of e-learning and E-portfolio from their existing knowledge.

Which of the following statement(s) best describe(s) your understanding of Electronic Learning (e-learning)?

ANSWERS (refers to legend)

Answer	Percentage
7	21%
6	29%
5	35%
4	34%
3	20%
2	52%
1	42%

PERCENTAGE SELECTED

0%   10%   20%   30%   40%   50%   60%

ANSWERS

1. Alternative mode of learning using specific electronic application
2. Internet-based learning
3. CD ROM/DVD-based learning
4. Intranet (workgroup)-based learning
5. Online assessment
6. Online Discussion
7. Learning via social network site, e.g. Facebook, LinkedIn

Figure 5.2: Views on E-learning definition based on participants' understanding

'What do you think is the literal meaning of the term "E-portfolio"?

ANSWERS (refers to legend)

Answer	Percentage
9	22%
8	29%
7	8%
6	26%
5	40%
4	34%
3	15%
2	34%
1	43%

PERCENTAGE SELECTED

0%   10%   20%   30%   40%   50%

ANSWERS

1. Alternative mode of file portfolio using specific electronic application
2. Internet-based storage of work
3. Online compilation of best achievement
4. Online assessment
5. Online submission of assignment or tasks
6. Online discussion (forum, email, messaging)
7. Similar to social network site, e.g. Facebook, LinkedIn
8. Can store images, video, notes
9. Can keep record for employment

Figure 5.3: Views on E-portfolio definition and function

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Figures 5.2 and 5.3 above indicate that, although many of the students had never been exposed to an e-learning or E-portfolio application, they could imagine that this system was Internet-based learning which was developed by a specialised application or program. A high percentage of respondents also perceived the E-portfolio to be a medium for online submission of assignments or specific tasks. This indicates that the students were more likely to associate the E-portfolio with a traditional file portfolio, the function of which is to collect evidence like assignments to be evaluated. They anticipated that this system will be an online version of a paper portfolio.

Similarly, the majority of the interviewees, who were officers, principals and trainers, viewed the E-portfolio as a collection of student work and records of their achievements over the duration of the learning and training. In addition, some of them expressed that the E-portfolio could be used as an assessment collection point, so the students' evaluation would be verified through it. The majority of the instructors also said that the E-portfolio could be described as a medium that might be used to monitor the progress of students throughout assignment development. They also considered the E-portfolio to be relevant to act as a means for virtual communication between students and instructors.

> *"I think this system can also be used to monitor student performance – if they are to complete the task or not…"- (Email, 2012, Instructor08, Female)*

> *"..Communication between us and them is very important. Though we cannot meet face to face, we still can respond through the system...If the system [is] able to do that…"- (Email, 2012, Instructor10, Male)*

Apart from the comprehensive functions of the E-portfolio, a number of them also believed that if the system was used in a committed and intensive way, it could be part of the system by which to assess the ability of the students. Students could submit assignments through this system and then have them reviewed and certified by the instructors. However, each assignment would need to be completed with the appropriate documents so that marking or grading could be conducted in a fair and equitable way.

b. *Anticipation of the designed E-portfolio system*

The interviewees were requested to confirm whether the E-portfolio development should be carried out and implemented in the Skills Training Programme. All participants showed full support for the E-portfolio to be developed and executed in this programme. However, there were conditions that needed to be taken into account, such as the system must be in accordance with the requirements of the programme, it must be a user-friendly and an attractive system, and its implementation would be based on the consent of the superiors and management in the respective Skills Training Institutes.

The students were also asked to express their views on the survey questionnaire on the necessity of the E-portfolio to be implemented in the Skills Training programme. By referring to Figure 5.4, it can be seen that 50% of respondents confirmed that the E-portfolio is very necessary to be included as part of the training and learning process, while 36% of them stated that it was necessary. Likewise, a total of 90% of respondents agreed that this system should be introduced and implemented in their training institute (please refer to Figure 5.5).
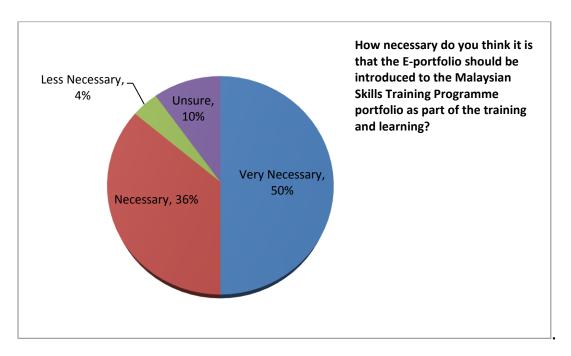
Figure 5.4: Data from the student survey questionnaire showing views on the necessity of introducing the E-portfolio
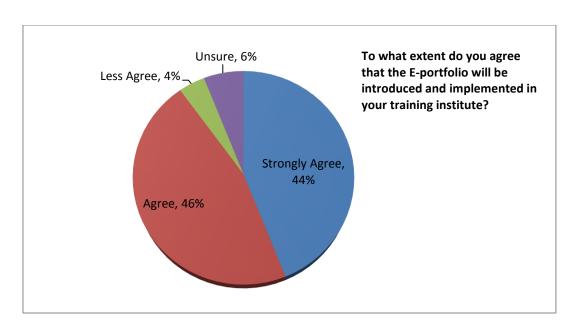
Figure 5.5: Data from the student survey questionnaire showing views on whether the E-portfolio would be introduced into their training institutions

The Skills Training concept is where the Department of Skills Development (DSD) under the Ministry of Human Resources awards the Malaysian Skills Certificate (SKM) or Malaysian Skills Diploma (DKM) to those who qualify through a few accreditation methods, for instance, competence in Skills Training courses, the Recognition of Prior Achievement and several other ways. The Malaysian Skills Certificate has five (5) different levels, according to its own definition (Table 5.3).

Table 5.3: Definition of Levels

LEVEL	DESCRIPTION
Level 1	Perform a variety of skilled work activities, which are largely prevalent and predictable.
Level 2	Perform a variety of skilled work activities in a diversity of contexts, some are not commonly done and require responsibility and self-autonomy.
Level 3	Perform a variety of skilled work activities in a diversity of contexts, many of which are complex and not usually practised. Possess responsibility and high in self-autonomy, as well as control and provide guidance to others.

Level 4	Perform a variety of skilled technical and professional activities of a broad scope and context. Possess responsibility and high in self-autonomy, as well as common responsibility for the work of others and allocation of resources.
Level 5	Competently use various fundamental principles and complex techniques, in the broad scope and often unexpected. Possess responsibility and very high in self-autonomy, also being responsible for other people's work and able to allocate and share resources. Moreover, need to be responsible for analysis, diagnosis, design, planning, operation and evaluation.

Based on the description of each level and expected abilities developed by the students, it is very important to determine the needs of the system, whether it is suitable to run on all levels, or should it be limited to a few levels that demonstrate advanced capability. All interview respondents agreed that students on the Skills Training Programme should be exposed to IT technologies such as E-learning, E-portfolio and any electronic application that suits their learning environment (Abd Aziz & Haron, 2012; Dollah et al., 2012; Zulkefli et al., 2012). This is supported by Saud, Rahman, & Shiung (2007) where they obtained the views of vocational undergraduates from several Malaysian higher learning institutions in relation to an E-learning application for vocational and skills trainees. The findings reported that the majority of the undergraduates agreed that vocational and skills trainees need to master a variety of computer skills in addition to their course specialisation in order to pursue the higher learning pathway as well as to step into the world of work.

However, in my research there were quite different views gained from both survey questionnaires and interviews in terms of the E-portfolio's mode of usage. A number of interviewees agreed to introduce this system as an add-on to complement training on levels 1-3 while for levels 4 and 5, which are mature trainees, they suggested using this application as part of the training process, such as in the module assessment, final project and industrial training. This finding is consistent with a study by Mohd Isa, Salleh, & Mustapha (2009) where they reported that vocational and skills trainees need to be trained according to their inclination and level of ability in order to prevent learning difficulties. Furthermore, the skills training policy also confirmed that trainees in lower levels (level 1 and 2) are more exposed to basic training and routine tasks while trainees in level 3 and above could absorb a few elements of management and supervision (DSD, 2007a).

On the other hand, another opinion recorded by the Ministry officers was that this system should be compulsory: applied to all trainees so that they could master the computer skills regardless of their level. This is based on the requirements of National Competency Skills-Core Abilities, which state that computer skills are necessary for every trainee on the skills training programme, depending on the level's competency standard (DSD, 2007b). Meanwhile, from the survey data shown in Figure 5.6, 35% of all respondents believed that the E-portfolio should be introduced to all students, regardless of their course level, as a compulsory element in the training module. The graph shows that a higher percentage felt that the E-portfolio should be a compulsory element rather than a complementary one. It is evidenced that most of the students could accept the E-portfolio in their training module and as part of the training assessment. Please refer to Figure 5.6, as follows:
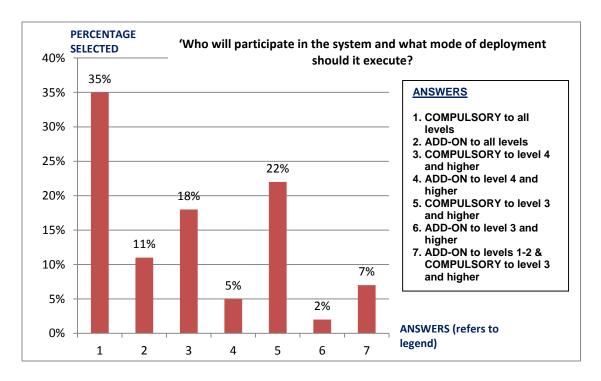
Figure 5.6: Views on E-portfolio participants and mode of deployment

Thus, by looking at both views (the interviews and survey), it is clear that the developed E-portfolio should be applicable to all levels of skills training courses and properly adapt the training syllabus to suit each level. Despite the contradictory opinions, it is the decision

of the Ministry or the skills institutions themselves whether to make it compulsory or vice versa.

c. *Important key factors in developing an E-portfolio*

Prior to a system's development, it is necessary to emphasise the important features required by the target user to ensure the success and usability of the system (Ellis, Ginns, & Piggott, 2009; Randall & Neiman, 1994). Since the user is the end user who will be the one actually using the system, any comments and suggestions from them should be taken into account.

According to some interviewees, the main factor contributing to students' acceptance of the system is the instruction language used. Since most of the students had little English communication, then it was recommended that the system be developed using the Malay language only (Zulkefli et al., 2012). Furthermore, the system developed must be user friendly and have understandable functions since there are not many students who are IT literate and proficient in using an online system. The user manual should be complete with step-by-step explanations and clearly define each function in the system.

From the interviews, the senior officers also stressed that the system should contain training modules for each course. The modules need to be pre-loaded before implementation begins. This will make it easier for students to choose their modules to load their work and assignments. In his literature review of E-portfolios, Butler (2006) mentioned that, for electronic portfolio systems to be successful, a different set of criteria needs to be met. Apart from the factors mentioned above, such as complete user manual, language design and pre-loaded modules in the system, the interviewees agreed that some other factors should also be included in the criteria for success, such as process planning, intensive training of users, support and enforcement from management, and giving students frequent motivation with the aim of emphasising the importance of this system in the learning process.

On the other hand, data from the survey questionnaire indicated that "Passion and determination of the user" and "Provision of facilities" had the highest percentage and thus were seen by students as being the foremost factors that influenced the success of an E-

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portfolio in one institution. Meanwhile, the "Enforcement from management" factor was last in the list. Please refer to Table 5.4 below for more details.

Table 5.4: Ranking of success factors of E-portfolio implementation

Ranking	Factor
1	Passion and determination of the user
2	Provision of facilities (e.g. devices, computers, Internet)
3	The purpose of the system (e.g. online assessment, social interaction, compilation)
4	Technical assistance from other related personnel
5	Support and encouragement from third parties (colleague, instructor, principal)
6	Enforcement from management

Theme 2: Benefits of an E-portfolio

According to several previous researchers, the E-portfolio could provide clear benefits and is considered important in the vocational teaching and learning process (Turhan & Demirli, 2010; Hallam, 2008). Results from the interviews found that the benefits expected to be generated through the implementation of the portfolio can be divided into three parts: enhance students' reflection, improve learning skills and save resources.

a. *Enhance students' reflection*

The E-portfolio is a medium that allows the students to place their work online either for personal satisfaction or to be reviewed by others. Furthermore, E-portfolios allow multi-party communication through online means. Most interviewees believed that, by encouraging communication between instructors and students or among students themselves, this could increase the confidence level of the students towards the training objective.

"I think they can personally ask if there is a problem that should be resolved with the instructor through this system. This may be more focused on students who behave shyly or feel inferior to ask [questions] during lecture sessions' ...." – (Email, 2012, Instructor08, Female)

In addition, the instructors viewed that virtual communication could indirectly support students to actively respond. It allows fast feedback and they could reflect and improve themselves according to people's annotations. This phenomenon will create an active learning environment among students and is also able to bridge the communication gap outside of the classroom between students and instructor. Other than that, the students can interact socially together with partners in producing group work or open space discussions. This is because by using this online system it is easy to carry out and share their work with peers, parents, instructors and prospective employers.

b. *Improve learning skills and knowledge*

The E-portfolio is also expected to provide benefits in terms of enhancing students' practical skills such as computer skills as well as computer applications and Internet usage (Abd Aziz & Haron, 2012; Zulkefli et al., 2012) . Moreover, by using resources obtained from the Internet and support from organising functions in the E-portfolio itself, they can develop a more organised and structured report. They also can use more extensive material including pictures, sound, animation, graphic design and video. This report can facilitate them to complete their assignments throughout the course work period.

"...When they are exposed to an online system that requires Internet access, it's likely they will be exposed to Internet facilities such as information search on 'Google' and other applications that are available in the Internet..." – (Email, 2012, Instructor09, Female)

"... The progress monitoring functions that are available in the system might possibly enhance their ability to produce reports that are more structured and organised" – (Email, 2012, Instructor08, Female)

Based on survey data, it was found that 46% of respondents agreed that the E-portfolio could enhance their knowledge and skills in computer and information technology. This additional skill is imperative for them because, as skills training graduates, they need to be equipped not only with their field skills, but also with the basic skills needed to work in the

industry later. The pie chart in Figure 5.7 below shows the statistics regarding respondents' perception about the possibility of this system becoming a learning tool for enhancing comprehension and performance during a training course. The statistics show that 58% of them were certain that this system would provide assistance as a learning tool during training, while 36% were relatively convinced.
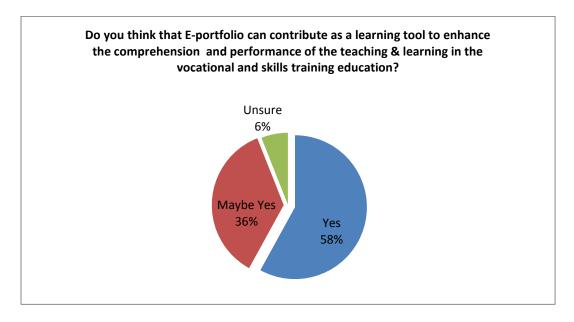
Figure 5.7: Views on E-portfolio as a learning tool in the Skills Training Programme

The survey also investigated the expectations of the students towards the E-portfolio if this system was introduced in their institute. Most of them agreed that this system would improve their IT skills and knowledge. Additionally, they hoped that it would be an easy and comprehensible system for them. Please refer to Table 5.5 to view the full details regarding expectations obtained from the data.

Table 5.5: Students' expectations of E-portfolio application

No	Expectations of the E-portfolio application	% of respondent chose
1	It will improve my IT skills and knowledge	57%
2	It will be an easy and comprehensible system	46%
3	It will give me new skills and new experience during learning	43%
4	It will be a tool to enhance my understanding of the course on which I am enrolled	22%
5	Everybody will give cooperation, support and encouragement	18%
6	It should not be compulsory, but only voluntary participation	9%
7	It should be compulsory for all, so it will be deployed fairly and equitably among students	6%

c. Save resources

Cost is an important issue prioritised by every organisation when considering whether to perform any activity or improvement. Abrami & Barrett (2005) viewed E-portfolios as a cost-effective technology to be distributed among learners. Freitas & Mayes (2004) agreed with this, mentioning that using technology is a more cost-efficient way of bringing the learning environment to the learners.

Views have been obtained and summarised into three main groups of resources: time, training materials and energy. Most of the interviewees – especially the instructors – thought that this system could help them save time in communicating with students and providing feedback on students' work beyond the lecture or training period. They also believed that by using the online system they could possibly accommodate many students' enquiries and problems as well as speed up the response time to a large number of students.

Additionally, most of the principals and officers projected that the E-portfolio could save the cost of materials involved in training, like papers, files, stationery and printing tasks. Some of them mentioned that they were always facing complaints from students that the cost of printing and binding work was becoming more expensive. They hoped that this system could reduce the burden of students' costs.

> *"This system might save the cost of materials such as paper and printing because these works can be viewed online"- (Email, 2012, Manager06, Male)*

This corresponds with data from the survey questionnaire where 40% of the respondents agreed that using the E-portfolio might save students' printing cost, time and energy. Meanwhile, 29% of them agreed that this system might increase the consultation space between student and instructor via online communication. Besides saving time and materials, the E-portfolio was also perceived as being able to assist users to save their energy during learning and training sessions. The instructors said that this is more focused on students who stay off campus and are unable to attend an extra group discussion with peers outside class hours. They could use the discussion forum in the system and participate sensibly.

Theme 3: Constraints and Issues concerning the E-portfolio

Despite the benefits that may be offered by the E-portfolio, challenges and constraints to the development of this system should be taken into consideration so that the objective can be achieved. Previous studies have presented a number of issues involved with E-portfolios (Abrami & Barrett, 2005; Carliner, 2005a; Challis, 2005). The issue of the authenticity and originality of student work and how to ensure that the evidence submitted has been prepared by the student him/herself was raised by Abrami & Barrett (2005). Furthermore, they argued that there was an issue regarding imitation and how to determine the ownership of the work because sometimes students neglect to keep their work safe. More issues to be addressed are in terms of administration of the system, such as data management, security and authorised issues, as well as the need to limit student accounts so that they cannot access other people's work (Challis, 2005). On the other hand, the system design and interfaces

also have an important role in attracting users. They should also be developed to meet the needs of the target participants, ranging from the various levels of technical expertise (Carliner, 2005a).

According to the interviewees with regard to issues and problems that may be encountered before and during the implementation of the E-portfolio, all of them agreed that there are numerous challenges that need to be measured before implementing this system intensively. Forty-five percent of students also agreed that to implement and establish this system might need full cooperation from all parties and this is a great challenge that needs to be taken into account. The views on several issues were collected and categorised into four groups: attitudes and user acceptance issues, issues associated with top management, technical support issues, the system design and issues of implementation costs; are discussed below.

a. *Attitudes and User Acceptance Issues*

Instructors from both public and private institutions stated that any kind of system could be implemented, but that it requires a long time to familiarise trainees with a new system due to the attitude and skills or weaknesses in the trainees themselves in terms of adopting these technologies. The instructors also mentioned that the system will be expected to confront users' issues like lack of computer skills, low self-esteem, low level of creativity and innovation, and becoming too dependent to others. One instructor quoted:

> *"...major challenge for the implementation of a system if the user is unfamiliar with the computer such as students in cookery courses, electrical, sewing and other courses who are not involved with computer technology....it's quite hard for them especially those whose background was from an urban area and [who have not been] not exposed to this kind of technology...." – (Email, 2012, Instructor10, Male)*

This is also likely to be experienced by an instructor who has less knowledge and skill in the intricacies of computing. Similarly, the student respondents also admitted that a lack of passion and determination to use this system is the most important challenge to be encountered. This is clearly shown by the majority of them choosing this factor as the first one in the ranking (please refer to Table 5.5).

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Therefore, it is vital to think about the right approach to be instilled in and motivate the user concerning the importance and capability of the system to support them in training sessions.

b. *System Design*

As asserted by Carliner (2005b), it is necessary that the design of a system meets the needs of users from different backgrounds; this system should also be designed to suit utilisation by both students and instructors, the majority of whom possess poor technical skills (Zulkefli et al., 2012). Features such as a bi-lingual medium, easily identifiable user interfaces, clear icon functions and understandable utilisation flow ought to be included in the system. However, as the system is developed using open source software and has a limited function, the system developers need to find alternative ways to meet user requirements. On the other hand, the instructors were less worried about the issue of plagiarism because these students have to develop reports based on individual practical work. Any replication can be detected manually by the instructor based upon their hands-on work results. Therefore, they felt that designs which incorporate features that can detect plagiarism are not really necessary for the time being. From the students' viewpoint, they seem to demand a system that is easy to explore and contains comprehensible functions. Although MAHARA is relatively easy compared to other fully featured E-portfolios like PebblePad, this demand should be taken into account and the ability of the users should be considered, as they are skills training students, the majority of whom have academic difficulties.

c. *Management Issues*

In any organisation, in order to implement reforms, support from all parties is highly desirable. According to the opinions of most of the interviewees, in order to implement this system in the training institution the support of the management and administration is of the utmost importance. If they feel that the system is beneficial to the organisation, then they will cooperate in enforcing the use of the system for students and instructors as well as granting approval for provision of the required hardware and software. But if management refuses to provide support, users will consider that the system is unimportant and that they can decide not to use the system in practice. Therefore, this system must have

the trust and approval from management and stakeholders in the organisation. How to get that trust is a challenge that must be faced with determination.

> *"...Support from management is very important especially in the provision of facilities and the need to implement this system effectively. In addition, enforcement should also be notified to the students and instructors so that they comply with the directive. If management act with a nonchalant attitude, the student and the instructor will not see the significance of this system in their institutions...more or less, they will ignore it just like that..."* - (Email, 2012, Officer05, Male)

d. Technical Support

Assistance from the support team is essential in playing a role in increasing users' motivation and confidence while using the system (Ellis et al., 2009). Since this system is implemented and monitored through a long-distance method, then technical assistance seems complicated and users can only rely on online communication facilities such as email and instant messaging (Skype, Yahoo Messenger, Facebook, Twitter and Google Chat). According to the respondents, there ought to be a person appointed to deal with this system in an organisation. This will enable users to have someone to refer to in the event of any problems.

Alternatively, the developer must provide a complete system manual covering each function projected to be used by the user. Additionally, online assistance should be available at all times due to the time difference between the two countries. This challenge should be undertaken to ensure that users do not reject using the system.

e. Implementation Cost

The majority of respondents agreed that cost is an important factor in determining the 'implementation of a new system. To develop a system in a training institution, the associated costs include provision of hardware and software requirements, training costs, the cost of on-going maintenance and the additional costs of the officer assigned to maintain the system.

"..The main constraint of E-learning is the financial factor. Training centre needs to provide hardware such as computers, scanners, cameras and perfect software .Computer network should also have a large bandwidth so that the system can be operated without troubles"-(Email, 2012, Manager07, Male)

Some respondents said that the cost factor is the reason why certain training institutions do not want to commence E-learning. In addition, officials said the cost will increase by almost 80% if the training institutions are located in remote areas such as in Sabah and Sarawak, districts which have a hilly and uneven geographical structure.

"...the rural areas require special equipment such as high-powered satellite transmitter. It is very expensive and requires high maintenance costs…"- (Email, 2012, Officer01, Male)

Consequently, before implementing the system numerous things need to be noted as vigilant planning should be carried out so the approved cost will not increase due to overlooked items or carelessness. Actions such as finding alternatives like using free software and ensuring easy data handling (do not require large databases) as well as the use of methods that are easily understood (without a lot of training) should be incorporated to help reduce costs.

5.2.5 Summary

Based on the findings of both the interviews and the questionnaire, three main themes emerged. The first one, which is the E-portfolio function, has been described as Internet-based learning and a computer application. Furthermore, the E-portfolio was also perceived to have the potential to act as a medium of communication, to compile records, as an evaluation and assessment method, and also can be used to track and monitor the trainees' learning progress. The second theme is E-portfolio benefits where respondents believed the E-portfolio could improve two-way communication between students, peers and instructors. It was also expected to support learning progress through small task accomplishment, as has always been highlighted in most of the skills training courses (McCowan, 1998). Additionally, it was also hoped that there would be benefits in terms of

saving training costs such as printing. Furthermore, the E-portfolio was also expected to help enhance the students' learning reflection and improve their IT and computer skills. The last theme is E-portfolio challenges, where these findings contributed to the essential part of the research in order to plan the project wisely. Issues raised by the respondents such as implementation cost, physical facilities and the management matters need to be attended to when planning the project. The other parts which need to be taken into consideration are technical assistance and the system design. They must be clearly defined so the objectives of the project will be successful. Finally, the greatest concerns are the user attitude and authenticity of the work. Users are the essential part in the system as they are the ones who make the system work. The most challenging part is to attract people to use the system and use it correctly. Correctly here means the works produced and entered into their E-portfolio are original, authentic and follow the requirements outlined by the instruction sheet. Strategies and techniques on how to maintain the users' engagement must be planned and executed prudently. The summary of the preliminary study is illustrated in Figure 5.11 as follows.
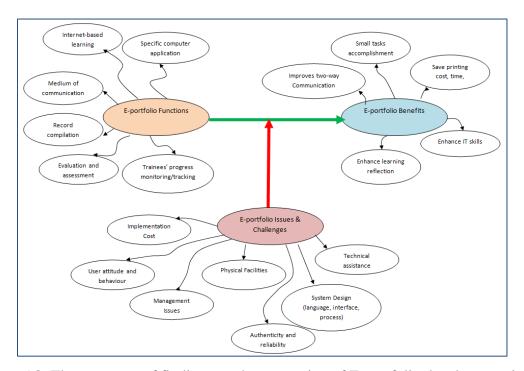
Figure 5.8: The summary of findings on the perception of E-portfolio development in the Malaysia Skills Training Programme

5.2.6   Lesson Learned – The key principles when developing the Skills Training E-portfolio

These key points were derived from the preliminary study, which I used as a guideline in planning and developing the E-portfolio project implementation.

1. **The E-portfolio needs to be bi-lingual**

   As explained before, the Skills Training programme caters for a group of students who have potential difficulties in accessing higher education; they mostly have a lack of competency in the English language. Therefore, it is advisable that the instructions embedded in the application are bi-lingual, in Malay and English.

2. **The assistance must be inclusive**

   Inclusive here means the instructor assistance, technical assistance and management support. The users need to be provided with continuous assistance from everyone to ensure this application is sustainable. The system's developer should be aware of the students' problems along the deployment process. The training should also provide sufficient help to the users by means of documents/manual preparation, verbal communication or video tutorials. The process of deployment needs to be explained to the instructors to enhance their understanding of how to evaluate students' work, and the most important thing is how to prevent students submitting unauthentic work.

3. **Design the E-portfolio process to meet the context in which it is to be used (to all levels)**

   The diversity of purposes supported by E-portfolios can lead to misunderstandings about the focus of a fresh implementation initiative. The objectives of the implementation of this application should be presented in a complete process of teaching and training using E-portfolio technology. This is supported by Becta Case Studies executed by a Research Group at Nottingham University where they suggested that E-portfolios benefit learning most effectively when considered as part of a joined-up teaching and learning approach, rather than as a discrete entity (Becta, 2007). This process should be designed according to the needs of the course and must suit or be adaptable to the current pedagogies as suggested

by Joyes et al. (2010), where processes involved in the creation of the E-portfolio in the particular context must be understood and both technical and pedagogic support needs to be provided to ensure the success of the system's implementation.

4. **Design the E-portfolio interface to be easy to use/intuitive**

The computer application must have an interface and features that motivate the users to continue exploring and using the system (Jaryani et al., 2005). An effective user interface is one that is easily understood by the user and has straightforward functions through its icons or links. Therefore, the system should be designed to show all primary functions on the main screen right after the user has logged on.

5. **Sufficient facilities must be provided**

Facilities like devices (computers, laptops) and established Internet lines are the most important things to be supplied to the students. It is also advisable to provide additional peripherals like digital camera, webcam, speaker and microphone.

6. **Low-cost application and technical maintenance**

Many institutions, especially privately owned colleges, were reluctant to invest in licensed software applications because they will continue to incur costs throughout the implementation period. So, an open-source application will be the best choice because less maintenance is required and there is no need to purchase a license. However, the institutions will still need to spend money on a server host to store the system's data as well as the students' work.

7. **Support and motivation of all**

The management of an institution should see this project as being as important as other training pedagogy. The qualification body should also recommend and encourage the training centres to be involved with this project so it will become a noteworthy project for the Skills Training Programme. It will improve the users' motivation to continue engaging with the system until the end of the allocated duration.

5.2.7 The key lessons from the preliminary study and action to be taken accordingly

Table 5.6 below summarises the lessons learned from the preliminary study and actions that need to be taken for the next phase (main study).

Table 5.6 Summary of Lesson learned from the preliminary study phase

	Summary of lessons learned from this activity	Action taken for the next phase
1	The E-portfolio need to be bi-lingual	- Main instructions were converted to the Malay language. The manual of use provided is completely in Malay and shows step-by-step instructions on how to execute the system throughout the project cycle.
2	The assistance must be inclusive	- I am always contactable and accessible through email and Facebook. The instructor was advised to guide the students using the manual provided. - Examples of pages will be provided to enable the user to get a real picture of what the E-portfolio will look like.
3	Design the E-portfolio process to meet the context in which it is to be used (to all levels)	- The PLAN function, which is the main activity in the process, will be emphasised in the manual and the front page of the system. - The forum function will also be activated to encourage user communication.
4	Design the E-portfolio interface to be easy to use/intuitive	- The titles as in headings and important links will be enlarged and in different colours to the usual ones.
5	Sufficient facilities must be provided	- Consent to use a computer in the resource centre and Wi-Fi around the campus was obtained from the principal.
6	Low-cost application and technical maintenance	- The system uses MAHARA software, which is free. The database was rented on a Malaysian hosting so the maintenance is managed by the company.
7	Inclusive support and motivation in all aspects	- The management was informed to encourage the participants by giving a reminder during the student/instructor monthly meeting.

5.2.8 Summary of the Preliminary Study – My Reflections

From the preliminary study, I gathered an abundance of essential information related to opinions and views from the stakeholders and students in the MSTP. I managed to obtain their understanding of the VLE and E-portfolio. Even though most of the students on the MSTP were low achievers in academic education, their knowledge of current technology was quite satisfactory. The feedback from principals, instructors and officers was also optimistic and supported the implementation. These signs were motivated me to continue to apply the E-portfolio in the MSTP. The findings fed me with information on their expectation from the E-portfolio (benefits), the important matters that I needed to bear in mind (challenges) and the requirements that will help sustain the E-portfolio along the project implementation (success factors). Overall, I am satisfied due to the feedback obtained from the respondents, who showed support and determination to assist me to continue with the project.

PART II: E-portfolio Deployment in 2013 & 2014 Cohort: The Implementation Processes

5.3 Planning Process

Prior to the deployment, careful planning has been taken as a priority to ensure the E-portfolio implementation could be run according to the project expectation and its objectives. The E-portfolio activities that blended with the conventional learning have been outlined according to the objectives set. These activities have been described in Chapter 3 previously. The clarifications about the E-portfolio and project details were explained in the E-portfolio manual and had been disseminated to all participants prior to the implementation.

This planning process covered both the 2013 and 2014 cohorts. I used the same process, although a few improvements in implementation technique were carried out in 2014 after

I had reflected on the results from 2013. The detail of the lessons learned after each year's implementation is explained in the next section.

5.3.1   Determine the participant, modules and duration of cycle

Therefore, after the planning process, which included the creation of the E-portfolio and module activities, the participants were targeted and the duration of the cycle needed to be considered. This is the most critical and longest part to be accomplished as each participant needs to submit a consent form to state their agreement to participation in this project. However, I managed to complete this step in around 6-8 weeks after disseminating the Participant Information Sheet and Consent Form.

In this step, two activities were implemented; the first was defining the groups for each course and the module to be involved in the project, and working out the duration for each group. After discussions with each course instructor, the module, duration, and participants were decided. Tables 5.7 and 5.8 show the list of courses that were included in the project in 2013 and 2014.

The second activity was to create a Facebook group page for the participants according to their courses. This social site acted as a communication medium between me as a researcher and the participants. A further function was to ease distribution of information, instructions and any acknowledgments to be made. The instructor was also part of the people in the group; therefore, any announcement was made through that medium.

Table 5.7 Experimental Design for the Implementation of the E-portfolio to the 2013 Cohort

Group	Code	Module	Module's Hour	Assessment Type	Session	Marking Scheme	Date
Computer System (12 trainees)	**CS2013**	02	60	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	11/02/2013-1/03/2013
Kitchen Practice (19 trainees)	**KP2013**	01	120	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	1/02/2013-28/2/2013
Dressmaker (8 trainees)	**FES2013**	02	60	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	22/4/2013-17/5/2013
Computer System (12 trainees)	**CS2013**	04	60	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	13/04/2013-1/05/2013
Kitchen Practice (19 trainees)	**KP2013**	03	120	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	1/04/2013-28/4/2013
Dressmaker (8 trainees)	**FES2013**	03	60	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	1/6/2013-30/6/2013

Table 5.8 Experimental Design for the Implementation of the E-portfolio to the 2014 Cohort

Group	Code	Module	Module's Hour	Assessment Type	Session	Marking Scheme	Date
Computer System (26 trainees)	**CS2014**	02	60	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	15/2/2014 – 15/3/14
Plantation (9 trainees)	**LDG2014**	01	30	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	10/1/2014 - 30/01/2014
Dressmaker (8 trainees)	**FES2014**	02	60	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	30/1/2014 – 30/2/2014
Electrician (15 trainees)	**ELC2014**	03	50	Special Project	Without E-portfolio (Manual paper submission)	Rubrics on Progress and final submission	15/3/2014 – 15/4/2014
Computer System (26 trainees)	**CS2014**	04	60	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	01/04/2014 – 30/4/2014
Plantation (9 trainees)	**LDG2014**	04	30	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	12/3/2014 – 02/04/2014
Dressmaker (8 trainees)	**FES2014**	03	60	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	5/3/2014 – 30/3/2014
Electrician (15 trainees)	**ELC2014**	04	50	Special Project	With E-portfolio (Online E-portfolio submission)	Rubrics on Progress and final submission	20/4/2014 – 15/5/2014

5.3.2 The Deployment Briefing and Information Dissemination

After the participants, modules involved and duration were determined, a briefing session took place prior to the project commencement. This session involved me and the instructors. We used the Facebook messaging application to enable group messaging. The project was explained and the documentation was distributed. The user manual, which contained the E–portfolio deployment process, was also supplied and clearly explained. The instructors raised a few questions related to the functions in the E-portfolio, hence these functions were described and explained to them clearly. The most important point here was to make sure these instructors understood the objectives of the system and how to operate the E-portfolio process as well as being able to re-explain the information to the students.

Then, the promotion of the system was made through the E-portfolio group page on Facebook to inform the student participants. The project information was disseminated here as well as the manual guides, examples of E-portfolio in another institution and links to exemplar E-portfolio pages created earlier. The process of deployment had also been explained to the students gradually on the Facebook page.

To maintain the user motivation, I offered online assistance through e-mail and the Facebook messaging system. The users had been told to send messages to me whenever they felt confused or unclear. Apart from that, to enhance their understanding of how to create an acceptable E–portfolio, the exemplar of an E-portfolio account was created and made public, so that is was accessible to all users. These examples contained pages that illustrated what an 'assessment page' was supposed to look like. A video had also been developed to provide a step-by-step guide on how to use each function in the E-portfolio application.

5.3.3 The Deployment Process

The project began when the instructors informed the students about the E-portfolio objectives, features and process activities. Then, they started to assist student participants

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to create an E-portfolio account, guided by the user manual. Then, each instructor inducted the session with questions in the Forum section. The learning activities that have been conducted in the class or during the hands-on training were also discussed in the Forum. However, not many students were really involved in the discussion. The same person posted responses in a few of the created topics.

Then, the main objective of the E-portfolio implementation began when the Performance Assessment question set was uploaded by the instructor. The students needed to develop Pages in their account, create the PLAN checklist, submit progress of work and eventually upload the final work to their account. These activities were carried out in a group. However, the outcome was marked individually depending on each student's participation in the group work.

My part during this phase was to promote the process cycle to both instructors and students by promoting it through the Facebook Page. A friendly reminder was also sent to the instructors via e-mail to notify them when a student uploaded her/his work to the account. The instructors needed to review, provide feedback and monitor the progress of each student's work, so the objective of the E-portfolio process could be accomplished.

5.3.4 Reflection

During the E-portfolio execution in the 2013 cohort, I observed that there were many deficiencies in the implementation such as less participation towards the end of the process, delays in gathering feedback from respondents and little support from the instructors to motivate the students throughout the session. Most of the students were only excited in the first week of the system's implementation. They slowly retreated and left the system after two weeks until the end of session. Meanwhile, the instructors did not actively encourage the students to use the system as they were also having difficulties in understanding its functions. These issues were because my assistance, which was carried out from a long distance, made the support process harder. Even though they were provided with a manual and detailed step-by-step instruction on how to use the system, this was not very helpful.

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There must be at least one person available to monitor and give immediate assistance during a session.

Thus, based on the experiences of the 2013 execution, I outlined the expected challenges that needed to be faced in the next cohort implementation. The issues are lack of commitment from students and instructors, student issues regarding personal attitudes like laziness and taking no interest in learning something new, system problems such as technical issues and a defective database, institutions' hardware and software problems, and interference from management and political views changing.

Therefore, in order to ensure that the system would run smoothly for the next cohort, a few steps were taken into consideration as precautions, such as to establish a good rapport with the institutions' management and become acquainted with all those who were involved in the implementation of this system, frequently sent friendly reminders to students and instructors' inboxes to alert them concerning what important tasks need to be carried out, prepare a complete and thorough manual to ensure they comprehend the system very well, provide frequent assistance via email and instant messaging available on the Internet, and initiate a peer-mentoring technique which includes assistance from competent students as mentors to help their mentees during a session. Table 5.9 outlines the summary of lessons learned based on the 2013 cohort implementation.

Table 5.9 Summary of lessons learned from the 2013 activities

	Summary of lessons learned from this activity	Action to be taken for the next phase
1	More assistance is needed	- The new strategy of peer mentoring was introduced for the 2014 cohort
2	Computer and Internet facilities are still insufficient to accommodate users.	- Consent to use the computer lab was obtained from the principal. The lab will be open to other non-IT students every day from 4-5pm
3	Different courses have different perceptions of E-portfolio objectives	- Give an option to those who want to use E-portfolios as a showcase/record compilation
4	Exemplar not sufficient	- Give more exemplars and samples of E-portfolio product
5	Communication with participants	- Lack of communication means less bonding with the participants. Must re-schedule the communication with participants to at least twice a week
6	Teacher/instructor lack of commitment/tends to forget to give feedback	- A friendly reminder to teachers using email and personal messaging if a new submission is placed in the E-portfolio.
7	Lack of motivation	- Must provide more interactive assistance such as a video tutorial for each function (forum, PLAN checklist, page development) to boost motivation and understanding. - Frequently in contact with the participants via online communication to strengthen bonding. - E-portfolio to be used as a teaching material to improve its image and explore its capability.
8	Survey questionnaires were taking too much time for the participants to complete	A friendly reminder needs to be sent regularly.

5.4 The Strategies Changed in 2014

During the deployment session in 2014, the process and steps taken were similar to the previous year's implementation. However, based on the reflection on the 2013 execution, a few strategies needed to be deployed in the 2014 session. The first strategy was the peer-mentoring which was initiated right after the information dissemination. The mentor was chosen by the instructor based on their capability to operate the computer/laptops and Internet application. Eight students were selected as mentors. The details of the mentor scheme are as follows:

Table 5.10 The number of mentors for the 2014 peer-mentoring strategy

2014 Cohort	Number of mentors	Ratio (mentor: student)	Completed Participants
Computer System (26 trainees)	4	1:6-7	18/26=69%
Plantation (9 trainees)	1	1:9	4/9=44%
Dressmaker (8 trainees)	1	1:8	4/8=50%
Electrician (15 trainees)	2	1:7-8	6/15=40%

The student chose their preferred mentor and joined their team. However, the mentor group did not affect the existing group that they had already set up earlier for the assessment. Also, the mentors were not bound to help only their mentees. They were also able to assist other mentees if needed. This coaching was normally conducted during E-portfolio sessions while they were in the computer lab. However, some mentors did the coaching in their free time in the student's hall or resource centre. During the first and second weeks when the peer-mentoring strategy was executed, the instructors mentioned that the mentors were busy assisting mentees to set up their E-portfolio account. Some of the mentors had to stay late on the campus in order to help the students complete the process. Then, the mentors also helped the instructors to post questions in the Forum and then taught their

mentees how to reply and respond to the posts. The mentors also demonstrated the steps to create a "Page", insert images, journals, texts and develop the PLAN functions. Despite the small number of mentors, the students were motivated and determined to continue the E-portfolio use with the support of their mentor.

The next strategy was to use the E-portfolio as a teaching material during lectures. One of the instructors from the Dressmaking course had developed an E-portfolio that contained images of current fashion available on the market and a previous event when they had once organised a fashion show in a shopping complex in town in 2011. The students seemed excited to watch the experience that the instructor had shared with them. Some of them mentioned that they hoped that this year (2014) that there would be another fashion show for them to contribute to and show their work. The instructor said that the E-portfolio helped her to organise the images by pages and insert a journal and links on the same page.

One of the Kitchen Practice (KP) instructors did the same thing to attract attention from the students during a lecture. Although her group of students did not participate in the E-portfolio sessions in 2014, she insisted on using the E-portfolio as a teaching resource. She uploaded her journal of achievement along with the images of every competition she attended. She also included the food products with which she competed in the event. She said that some of the students seemed determined and showed passion to strive harder to be chosen as participants in coming competitions. She admitted that it was easier to use the E-portfolio to insert everything on one Page rather than clicking several links or folders.

5.4.1 Reflection on the 2014 implementation

I observed a good improvement in terms of students and instructors' efforts to use this system compared to the previous year. I assumed that this was due to the exposure of some of the instructors to the previous year's implementation which had made them more aware of and given them a better understanding of the system. I also felt overwhelmed by the efforts that were made by the mentors and the instructors, even though the number of completed participants was still quite low, but most of the students did create their account

successfully. Most of the students who successfully completed the sessions were from people who needed less supervision, who managed to continue the process with minimum monitoring by their mentors. Some of the students who were constantly finding excuses not to carry out the task claimed that the mentor did not give them enough attention so they felt isolated and gradually left the session. Due to the terms and conditions of this project, which was 'voluntary', no compulsion could be made to force them to get back on track. The only thing the instructor and mentors were able to do was to encourage and motivate them to keep maintaining their efforts to finish the task.

For this year's implementation, the Internet capability still raised issues as the wireless Internet (Wi-Fi) was not fully functional in the student halls. This situation caused the students to have to depend on using the limited computers available in the lab and in the resource centre. A request was lodged with the management appealing to them to provide better Internet bandwidth facility. However, due to financial issues, this request could not be fulfilled.

5.4.2   *Summary of the 2014 Implementation*

From the 2014 implementation, there are five key points that can be taken into consideration, which are listed in Table 5.11 below.

Table 5.11 Summary of Lessons learned from the 2014 activity

	The summary of lessons learned from this activity
1	The peer-mentoring strategies would influence the students to keep using the system. This approach works, and thus can be continued to further projects.
2	The analysis of the showcase portfolio showed positive feedback. Students seemed happy to see images and successful stories on the page.

3	Less involvement from the management influenced the motivation and determination of the participants to continue with the project.
4	Poor facilities such as Internet connection also had a big impact on the statistics of system use during the project duration.
5	The two projects discovered different types of user and suggested the potential support that could assist them to persist in using the system.

5.5   Data Collection Process

The data collection process was conducted after each year of implementation had completed the project duration. In 2013 and 2014, the data collection started from April and continued until the end of the year. The data were collected from several sources such as interviews via instant messaging and email, the evaluation rubric and the survey questionnaires. Table 5.12 illustrates the data collection process for the 2013 and 2014 cohorts.

Table 5.12 Data Collection Process for 2013 and 2014 Cohorts

Session	Respondent	Date	Data collection/ Evidence	Data Analysis	Aim
Without E-portfolio (Manual paper submission)	39 Trainees registered (2013 cohort)	April 2013	Rubrics on Progress and final submission pre-deployment of E-portfolio	- Using Microsoft Excel to calculate the average of scores for pre-deployment. - Compare the increment of scores '3' and '5' for pre and post E-portfolio deployment	- To distinguish scores between pre and post deployment
	55 Trainees registered (2014 cohort)	April 2014			
With E-portfolio (Online E-portfolio submission)	27/39 Trainees (2013 cohort) - 69% completed	June 2013	Rubrics on Progress and final submission post deployment of E-portfolio		
	32/55 Trainees (2014 cohort) - 58% completed	June 2014			
After collecting and receiving marks from the Performance Assessment at the end of the module	27/39 Trainees (2013 cohort) 32/55 Trainees (2014 cohort)	June/July 2013 June/July 2014	Survey/Questionnaire	- Compare results between courses	- To evaluate the E-portfolio process that has been designed to assist students in accomplishing the Performance assessment. - To investigate their preference of using the E-portfolio
1) During the system deployment 2) After the survey analysis	27/39 Trainees (2013 cohort) 32/55 Trainees (2014 cohort) *Exact figures can be found in Chapter 6, 6.2*	Jan-Dec 2013 Jan-Dec 2014	Email Interviews Facebook messaging application Facebook Postings	- *A priori* codes based on pre-determined themes - Using 'Framework' approach to organising, sorting and analyse the data	- To support the findings from quantitative data analysis - To explore in depth the user experience when using the system - To explore in depth the user experience of deploying the new strategies for the 2014 cohort

5.6   Overview

This part presents the analysis of both quantitative methods conducted: the rubric of assessment and the survey questionnaire. The analysis was carried out according to the group cohorts, which are 2013 and 2014. For the evaluation rubrics, the analysis was based on the research sub-questions that adopted criteria from the CBT approach which were the knowledge and skills construction, the progress-based learning and the communication between peers and instructors. For the survey questionnaires, 10 variables intended to assess the process of E-portfolio deployment that were adopted based on features in the KEL theory and the CBT were analysed.

5.7   The Evaluation Rubrics – Pre and Post E-portfolio Deployment

The students were assessed after completing two modules without using the E-portfolio and one module with the E-portfolio involved. The modules do not need to be equal in terms of difficulty level, duration or activities to ensure the result is reliable. This is because the rubrics do not evaluate the final marks of the work produced. They aim to assess the students' changes in terms of communication, effort of learning and additional skills or knowledge gained after completing a module with the E-portfolio. Therefore, the objectives of the rubrics are to measure the changes prior and post deployment of the E-portfolio in terms of the following criteria:

1. The construction of new knowledge and skills that were measured by the "**organisation of ideas**" and the "**report format**" criteria. This aimed to determine whether students are able to generate new knowledge/skill or improve existing knowledge/skill in terms of laying out reports with organised ideas, present the outcome from hands-on training in a report which adhered to the instructions, and operate the computer and its application appropriately. For pre-deployment, the students were evaluated based on their practical task and the project report generated as instructed in the assessment sheets. For post-deployment, with the assistance of the E-portfolio process, the report was also evaluated.

2. The progress-based learning was measured by the "**progress of report**" and the "**quality of report**" criteria. These criteria intend to evaluate the students' learning effort, which is the process of accomplishing the final product of their assignment. The progress of the report encompasses the feature of reflection, which evaluates the student's effort in making a correction after being reviewed in the progress meeting. Additionally in this part, the quality of the report was measured with the assumption that students who always met the progress deadlines set by the instructors will have a better-quality report compared to those who did not. In the E-portfolio process, the deadlines for the students to upload their work progress were fixed by the instructors. In contrast to the pre-deployment, the progress meeting was optional.

3. Finally, the students' communication was measured by the "**communication with peers**" and "**communication with instructor**" criteria. For pre-deployment, the communication was evaluated based on instructor observation during lecture and hands-on training session. For post-deployment, besides observation in the classroom and workshop, the communication was evaluated by monitoring the students' participation in the Forum application, the feedback and comments on the E-portfolio pages, and the communication that occurred when they used the E-portfolio messaging system.

Therefore, the research sub-questions developed as a guideline that need to be investigated from this analysis are:

1. *Does implementation of the E-portfolio impact on the criteria measured through the assessment rubric?*
2. *Are there any differences between the pre and post E-portfolio deployment?*

Although the initial numbers of students were high during early involvement, the numbers had decreased when the end of the project cycle was reached. Data from the students who had successfully completed the E-portfolio project were included in the statistics. Thus, for this research, the pre-deployment rubrics only involved the completed students even though the instructor evaluated all students in the group. In 2013, 27 participants successfully submitted their assignments on their E-portfolio, and 32 students completed

in 2014. The same rubric was used to evaluate the students' work on pre and post-deployment of the E-portfolio. Table 5.13 shows the criteria included in the rubrics of assessment for both pre and post E-portfolio deployment.

Table 5.13 The rubrics of assessment for pre and post deployment of E-portfolio

Score / Criteria	5	3	1	0	Score
A.Organisation of Idea	All topics/subtopics were organised with continuity of ideas, orderly reporting structure and very easy to comprehend.	Majority of topics/subtopics were organised with continuity of ideas, reporting structure is less ordered, but the point presented still can be understood.	Most of the contents were not arranged according to topic/subtopic, causing less continuity of ideas. Unorganised reporting structure, so it was difficult to comprehend.	Scattered contents. No specialised topics/subtopics. Reports cannot be understood.	
B.Report Format	The entire report content was according to the standard format set.	The majority of the report content was according to the standard format set.	Only a little of the report content was according to the standard format set.	The whole report content did not follow the specified format set.	
C.Progress of Report	The student always seeks for views/review after completing each topic. Instructor's/Reviewer's opinion was taken into account in order to improve outcome.	The student meets instructors only if experienced problems. The correction was based on what was exactly suggested, less effort to improve outcome.	Student only meets instructors once/twice to show work. But the suggested correction was not taken seriously.	Student does not update the instructors on the progress of work at all. S/he submitted the final report on the submission date without being reviewed.	
D.Quality of Report	The report outcome is good and meets the quality requirements based on the question given.	The majority of the report outcome meets the quality requirements based on the question given	Although there were some mistakes, this report is still acceptable.	The report did not meet the quality requirements at all. Student made no effort to complete the report based on the question given	
E.Communication with Instructors	The student always communicates and refers to the instructors regarding the task given.	Student only communicates with instructors if experienced a problem.	Student only communicates with instructors 1-2 times.	The student did not communicate with instructors at all.	
F.Communication with Peers	The student was friendly and active in communication with group-mates as well as classmates/peers.	The student might have several close friends that he/she communicates with most but still can get involved with others.	The student was quite passive with peers, but still keen to join the group activity assigned.	The student did not get involved at all with group activities. S/he did not communicate with peers and preferred to be alone.	

5.7.1 Analysis Of Rubric

To obtain the result from the instructor, I designed a simple system using Microsoft Excel, harnessing its capability of providing and calculating formulas and functions. The instructor then keyed their students' results into the file, and the sum and percentage for each category were calculated and revealed. The analysis was implemented, starting from calculating the average scores of the two modules which did not utilise the E-portfolio. Then, the percentage that each student scored in each category was calculated. An example of the analysis is shown in Figure 5.9 below.

COURSE: CS 2014

WITHOUT E-Portfolio- AVERAGE

ANALYSIS OF SCORE** BY %	A	B	C	D	E	F
% OF SCORE 0	0	0	0	0	0	0
% OF SCORE 1	24	19	39	31	13	15
% OF SCORE 3	61	58	22	39	11	67
% OF SCORE 5	15	23	39	30	76	18

WITH E-Portfolio

ANALYSIS OF SCORE** BY %	A	B	C	D	E	F
% OF SCORE 0	0	0	0	0	0	0
% OF SCORE 1	2	4	10	12	2	2
% OF SCORE 3	44	52	56	67	33	33
% OF SCORE 5	54	44	34	21	65	65

COURSE : ELC 2014

WITHOUT E-Portfolio- AVERAGE

ANALYSIS OF SCORE** BY %	A	B	C	D	E	F
% OF SCORE 0	2	8	8	2	2	2
% OF SCORE 1	41	56	44	49	50	33
% OF SCORE 3	52	32	42	44	43	61
% OF SCORE 5	5	4	6	5	5	4

WITH E-Portfolio

ANALYSIS OF SCORE** BY %	A	B	C	D	E	F
% OF SCORE 0	0	0	0	0	0	0
% OF SCORE 1	10	10	16	16	8	8
% OF SCORE 3	48	55	58	45	55	53
% OF SCORE 5	42	35	26	39	37	39

*Criteria

Criteria	Description
A	Organization of Idea
B	Report Format (Font,Size, Margin,Title,Cover, TOC, Image ETC)
C	Progress of Report
D	Quality of Report
E	Communication with Instructors
F	Communication with Peers

**For description of Score 0,1,3 and 5, please refer to Rubric of assessment (Table 5.15)

Figure 5.9 A snapshot of the analysis of the rubric scores

As the objective of the method was to find the differences before and after portfolio deployment, the next analysis was to calculate the increment of percentages for **scores '3' and '5'** on both pre and post result. I chose the scores '3'and '5' because the project was targeted to ensure the students scored **at least '3'** in the post-deployment assessment. Thus, I assumed that there was supposed to be an increment of the '**3**' and '**5**' scores from pre to post deployment in order to claim that the E-portfolio process had an impact on the students' learning. Figure 5.10 to Figure 5.12 show the increment analysis that has been produced based on the overall scores gathered.

Figure 5.10 shows that, in both 2013 and 2014 cohorts, 80%-100% of the students scored 3 and 5 in criteria 1 and 2 with the E-portfolio deployment, compared to 35%-90% without the E-portfolio. Criterion 2 (The Report Formatting), scored a higher increment than the criterion 1 (The Organisation of Idea) in both years. KP in 2013 and ELC in 2014 were courses that contributed to the increment of this criteria. The instructors explained that the students felt that performing the E-portfolio process – which organised the task structure starting from the practical task, taking notes, recalling the procedures and finally reporting the performance – had aided the development and structuring of their ideas. Most of them agreed that using the Microsoft Office to report and present their performance had improved their IT skills and added new knowledge about the e-learning system.

For the next criteria, Figure 5.11 shows that the Criterion 4 (Quality of reports) gained the highest increment. The FES course scored a 70% increment from 30% when not using the E-portfolio to 100% when using the E-portfolio to complete the task. The instructor mentioned that previously students had used conventional pen and paper to produce a report, thus their handwriting meant that the instructor was sometimes unable to comprehend what they were reporting. By using word-processing software like Microsoft Word, the reports were more understandable and the students achieved the required level of competency. Overall, for both 2013 and 2014 cohorts, 78%-100% of the students scored 3 and 5 with the E-portfolio deployment in criteria 3 and 4, which represent the Progress-Based Learning theme. This result suggests that most of them showed improvement in the quality of their report and the work progress along with the report development.

For the Criteria 5 and 6 (The Communication with peers and instructor), Figure 5.12 shows that 88%-100% of the students in both cohorts scored 3 and 5 in the evaluation rubrics with the E-portfolio support. FES, ELC, KP and LDG scored the highest increment in each criterion in 2013 and 2014, while CS scored the lowest. One of the CS students mentioned that their communication with peers and instructor before using the E-portfolio had been established with the use of e-mail and instant messenger like Yahoo Messenger. Thus, this explains why the increment was not as high compared with other courses.

THE IMPROVEMENT OF SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2013 COHORT

CRITERIA 1 - THE ORGANIZATION OF IDEA

	WITHOUT EP	WITH EP	INCREMENT
CS (COMPUT	61	89	28
KP (KITCHEN	81	92	11
FES (DRESSN	90	100	10

CRITERIA 2- THE REPORT FORMATTING

	WITHOUT EP	WITH EP	INCREMENT
CS (COMPUT	58	96	38
KP (KITCHEN	35	91	56
FES (DRESSN	60	100	40

THE IMPROVEMENT FOR SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2014 COHORT

CRITERIA 1 - THE ORGANIZATION OF IDEA

	WITHOUT EP	WITH EP	INCREMENT
CS (COMP	76	98	22
ELC (ELEC	57	90	33
FES (DRES	62	84	22
LDG (PLAI	70	82	12

CRITERIA 2- THE REPORT FORMATTING

	WITHOUT EP	WITH EP	INCREMENT
CS (COMP	81	96	15
ELC (ELEC	36	90	54
FES (DRES	53	80	27
LDG (PLAI	64	92	28

Figure 5.10 The increment differences between courses in the 2013 and 2014 Cohorts for Categories 1 and 2 (Knowledge and Skills Construction)

THE IMPROVEMENT OF SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2013 COHORT

CRITERIA 3- THE PROGRESS OF REPORT

	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	22	78	56
KP (KITCHEN	38	96	58
FES (DRESSN	50	100	50

CRITERIA 4- THE QUALITY OF REPORT

	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	39	89	50
KP (KITCHEN	46	91	45
FES (DRESSN	30	100	70

THE IMPROVEMENT FOR SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2014 COHORT

CRITERIA 3- THE PROGRESS OF REPORT

	WITHOUT EP	WITH EP	INCEREMENT
CS (COMP	61	90	29
ELC (ELEC	48	84	36
FES (DRES	62	82	20
LDG (PLAI	54	92	38

CRITERIA 4- THE QUALITY OF REPORT

	WITHOUT EP	WITH EP	INCEREMENT
CS (COMP	69	88	19
ELC (ELEC	49	84	35
FES (DRES	63	88	25
LDG (PLAI	54	90	36

Figure 5.11 The increment differences between courses in the 2013 and 2014 Cohorts for Categories 3 and 4 (Progress-Based Learning)

THE IMPROVEMENT OF SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2013 COHORT

CRITERIA 5- COMMUNICATION WITH INSTRUCTOR			
	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	22	89	67
KP (KITCHEN	46	94	48
FES (DRESSM	30	100	70

CRITERIA 6- COMMUNICATION WITH PEER			
	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	67	94	28
KP (KITCHEN	65	96	31
FES (DRESSM	90	100	10

THE IMPROVEMENT FOR SCORES 3 AND 5 BY CRITERIA (WITHOUT EP VS WITH EP) - 2014 COHORT

CRITERIA 5- COMMUNICATION WITH INSTRUCTOR			
	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	87	98	11
ELC (ELECTR	48	92	44
FES (DRESSM	52	90	38
LDG (PLANT	50	88	38

CRITERIA 6- COMMUNICATION WITH PEER			
	WITHOUT EP	WITH EP	INCEREMENT
CS (COMPUT	85	98	13
ELC (ELECTR	65	92	27
FES (DRESSM	54	90	36
LDG (PLANT	50	92	42

Figure 5.12 The increment differences between courses in the 2013 and 2014 Cohorts for Categories 5 and 6 (Communication with peers and instructors)

5.7.2 Summary of Findings for the Rubric of Assessment

In summary, the analysis revealed that all criteria in both cohorts showed improvement based on the score percentage without the E-portfolio and the percentage with the use of the E-portfolio. It is suggested that, due to the increment, the aim – which is to investigate the effect of the E-portfolio to support knowledge construction, progress-based learning and the communication with peer and instructor – has been achieved. The E-portfolio application seems to have made a contribution to the improvement of those criteria, even though the increment differences were variable.

5.8 Survey Questionnaire

The survey comprises 10 variables that represent the process and objectives of the E-portfolio that was utilised during the course. The variables were derived from both KEL and CBT characteristics. The latter is the Likert-scale questionnaire where 1 is Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree and 5-Strongly Agree.

Four activities were conducted as part of the analysis where firstly a Descriptive analysis was performed to investigate the respondents' background, such as the gender and course enrolled. The computer and Internet literacy skills were also measured to see the different levels of competency between students on all the participating courses. Beforehand, a Z-scores analysis was executed to measure the normality in the data distribution (West et al., 1995). Secondly, the central tendency measurement for the non-parametric test, which is median, and the Kruskal Wallis test were executed for each theme to find any significant findings. I chose to use these tests due to the type of data, which are non-continuous data, an ordinal data type in SPSS. Foster (1998), in his books mentioned that:

"In order to use the parametric statistical tests, one should have used an interval or ratio scale or measurement. If the data is measured on an ordinal scale, use non-parametric tests" (Foster, 1998, p.7)

Therefore, the median and Kruskal Wallis tests are the non-parametric tests which were suitable to measure the ordinal data type due to their robustness (Foster, 1998). This analysis has two objectives: the first one is to measure the median scores of each variable as the target of the minimum score is 4.0 (Agree), which suggests that the characteristic of the E-portfolio process that is represented by the variable is acceptable. Then the Kruskal Wallis test was executed to measure the differences in scores among the courses. Therefore, the second aim was to find out any significant difference between courses for each of the variables. Thus, the hypotheses developed for this data analysis were as follows:

1. The E-portfolio process does support the progress-based learning
2. The E-portfolio process does support the learning reflection
3. The E-portfolio process does support the knowledge construction
4. The E-portfolio process does support the social communication
5. The E-portfolio process does increase the learning motivation
6. The E-portfolio process does increase the learning responsibility

I presumed that factors of these characteristics would achieve a minimum median score of 4. The null hypothesis for differences between courses was also developed as:

1. There is no significant difference between courses using the E-portfolio process.

The third analysis involved only a few themes that showed the significant influence of the E-portfolio. The correlation analysis measured the few items in the questionnaire that related to each other. This was to check whether those factors were important influences which affected the operation of the system. A Spearman Rho's correlation test was conducted to achieve this objective where an expected r value of >0.7 indicates a strong relationship between those items.

The fourth analysis further investigated selected questions that had the main impact on E-portfolio processes. The analysis was conducted by comparing the frequencies of responses. This analysis was also conducted for only a few items that were important to show the effectiveness of the E-portfolio.

5.8.1 Data Normality Test

Twenty-seven participants who successfully submitted their assignments on their E-portfolio filled in the questionnaire via online survey for 2013 and another 32 respondents were involved from the 2014 cohort. Prior to further analysis, the normality of data distribution needed to be measured based on the skewness and kurtosis value. The purpose of conducting a skewness and kurtosis analysis is to present two methods of measuring the normality of distribution of values (Creswell, 2003). In this study, I am using Z-scores to understand the normality of data distribution. If data are normally distributed, approximately 95% of the data should have a Z-score between -1.96 and +1.96. Z-scores that do not fall within this range may be less typical of the data in a bunch of scores (Ghasemi & Zahediasl, 2012; West et al., 1995). The formulas to calculate the Z-scores are as follows:

$$Z\_skew = skewness \ values/Standard\_Error \ (skew)$$
$$Z\_kurtosis = kurtosis \ values/Standard\_Error \ (kurtosis)$$

In the 2013 cohort, there is one question where the skewness and kurtosis do not fall between +/- 1.96 and, in regards to 2014 cohort, there are two questions where the skewness and kurtosis do not fall between the expected +/- 1.96. Therefore, I assumed that these data were not normally distributed and further tests would need to be conducted and would have to deploy a non-parametric test. (Refer to Table 13 and 14 in Appendix 2)

5.8.2 The Descriptive Analysis

In this section, the details on participant's course, gender and computer and Internet literacy are described.

5.8.2.1 Participant's Course

For the 2013 cohort, 48% of the participants were from Kitchen Practice courses (KP), while 33% and 19% were Computer System (CS) and Dressmaker (FES), respectively. Table 5.14 shows the statistics for participants in the 2013 cohort.

Table 5.14 Participant's courses in the 2013 Cohort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CS	9	33.3	33.3	33.3
	KP	13	48.1	48.1	81.5
	FES	5	18.5	18.5	100.0
	Total	27	100.0	100.0	

Meanwhile, in the 2014 cohort, there were four courses involved, which are CS, FES, Plantation (LDG) and Electrician (ELC). The KP courses did not join in this year's implementation because they were busy preparing themselves for the Culinary Challenge that was being held at the end of the year. Table 5.15 shows the statistics for the 2014 participants' courses. CS contributed the majority of participants, which is 56% of the total. Another 19%, 13% and 12% were from ELC, LDG and FES courses, respectively.

Table 5.15 Participant's courses in 2014 Cohort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CS	18	56	56	56.3
	FES	4	12	12	68.8
	LDG	4	13	13	81.3
	ELC	6	19	19	100.0
	Total	32	100.0	100.0	

5.8.2.2 Participant's Gender

In both 2013 and 2014 cohorts, male students dominated the participation compared to female students. The courses that contributed the majority of male students were CS, LDG and ELC, while the majority of students on the FES course were female. On the KP course, the ratio between male and female students was approximately equal. Table 5.16 shows the percentage of male and female participants for both years.

Table 5.16 Participant's Gender in the 2013 and 2014 Cohorts

	Frequency	Percent	Valid Percent	Cumulative Percent
2013				
Male	14	51.9	51.9	51.9
Female	13	48.1	48.1	100.0
Total	27	100.0	100.0	
2014				
Male	18	56.3	56.3	56.3
Female	14	43.8	43.8	100.0
Total	32	100.0	100.0	
Total 2013 & 2014	59			

5.8.2.3 The Computer and Internet Literacy of the Participants

The participants were also queried regarding their computer and Internet literacy skills. This information was required in order to see the differences in those skills between the courses. Further strategy can be laid out based on these results, including the peer-mentoring and training needed for the users.

For this query, I chose to use the Kruskal-Wallis non-parametric test due to the non-continuous data that have been used (Foster, 1998). Tables 5.17 and 5.18 show the mean rank differences between courses in the 2013 and 2014 cohorts. For both years, CS scored the highest mean rank among the courses for both computer and Internet competencies. In the 2013 cohort, the mean rank of KP shows that these students were

more literate in both computer and Internet skills than those on FES. The significant differences is due to the p<0.05 (0.045 for computer literacy and 0.035 for Internet literacy), thus suggesting that the ranking position of those courses was acceptable.

Meanwhile, in the 2014 cohort, the CS scored the highest mean rank for both competencies. Due to only the computer literacy showing a significant difference between courses (p=0.033), it can be suggested that the CS rank first, the FES and LDG have the same position which is the second rank and ELC is in last position. However, for Internet literacy, the differences were not statistically significant (p=0.338) thus suggesting that all four courses have varied skill in this competency where the rank cannot be decided clearly.

Table 5.17 The Kruskal-Wallis Test for Computer and Internet Literacy in the 2013 student cohort

	ID	N	Mean Rank
COMP_LIT	CS	9	18.50
	KP	13	12.35
	FES	5	10.20
	Total	27	
INT_LIT	CS	9	18.83
	KP	13	12.35
	FES	5	9.60
	Total	27	

Test Statistics[a,b]

	COMP_LIT	INT_LIT
Chi-Square	6.193	6.710
df	2	2
Asymp. Sig.	.045	.035

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Table 5.18 The Kruskal-Wallis Test for Computer and Internet Literacy in the
2014 student cohort

	ID	N	Mean Rank
COMP_LIT	CS	18	20.11
	FES	4	13.25
	LDG	4	13.25
	ELC	6	10.00
	Total	32	
INT_LIT	CS	18	18.44
	FES	4	11.00
	LDG	4	14.50
	ELC	6	15.67
	Total	32	

Test Statistics[a,b]

	COMP_LIT	INT_LIT
Chi-Square	8.755	3.369
df	3	3
Asymp. Sig.	.033	.338

To summarise, the CS students in both cohorts were more literate in computer skills compared to other courses. For the Internet literacy skills, the CS students were more competent than KP and FES students in 2013, while the CS, LDG, FES and ELC students seem to have equal ability to operate the Internet application in the 2014 cohort. This situation suggests that CS students have the potential to be assigned as mentors or coaches to certain students who are having difficulties operating the computer on their own. This finding can also lead to an exploration to see whether the computer or Internet skills of a student could be related to their acceptance and ability to use the E-portfolio.

5.8.3 The Descriptive statistics, the Kruskal Wallis and the Spearman Rho's test analysis

To analyse the main content of the survey questionnaire which involved the E-portfolio processes, I used the Median score test, the Kruskal Wallis of variance test, the Spearman Rho's correlation test and a frequency measurement to explore the data. The results are presented by theme to ease understanding and interpretation. The results of median scores, the Kruskal Wallis and the Spearman's Rho has been put into tables and attached in the Appendices. Please refer Table 1 to 12 in the Appendix 2.

Theme 01- Objective-Based Instructions

Objective-Based Instruction (OBI)	1. I can understand the E-portfolio's manual of instruction 2. I can understand the E-portfolio deployment process in the module. 3. Each E-portfolio instruction was structured to suit tasks in the module.

The median results indicate that all courses in 2013 and 2014 achieved equal to or above the target score (4.0), which suggests that the participants were agreed that the E-portfolio instructions were developed for each task in the module and that they could understand the manual and deployment process provided. The Dressmaker (FES) course shows the highest mean rank in 2013 (Table 5.19), while the Plantation course (LDG) was highest in 2014 (Table 5.20).

Table 5.19 Mean Ranks for 2013 cohort (Theme 01)

ID		N	Mean Rank
OBI-01	CS	9	12.33
	KP	13	13.58
	FES	5	18.10
	Total	27	44.01
OBI-02	CS	9	11.89
	KP	13	14.42
	FES	5	16.70
	Total	27	43.01
OBI-03	CS	9	12.67
	KP	13	12.92
	FES	5	19.20
	Total	27	44.79

Table 5.20 Mean Ranks for 2014 cohort (Theme 01)

ID		N	Mean Rank
OBI-01	CS	18	18.36
	FES	4	9.88
	LDG	4	19.75
	ELC	6	13.17
	Total	32	61.15
OBI-02	CS	18	17.69
	FES	4	17.00
	LDG	4	20.38
	ELC	6	10.00
	Total	32	65.07
OBI-03	CS	18	17.36
	FES	4	10.13
	LDG	4	20.50
	ELC	6	15.50
	Total	32	63.49

From the interviews with the instructors about this circumstance, it was noted that there were only eight people in a group on the Dressmaker course, and so more attention was

given to them during the system's deployment. This also happened with the Plantation course, where there were only nine people in a group. The instructor admitted that she was comfortable managing fewer people in a group so that she could focus on each student individually. A Kruskal Wallis test was conducted to compare the scores of items (OBI-01, OBI-02 and OBI-03) to see if there was any significant difference between courses. The results in 2013 showed that there was no significant difference between those scores against courses at the $p < .05$ level for the three items, where the p values are **0.326, 0.406** and **0.226**, while, in the 2014 cohort, the p values for the three items were **0.169, 0.102** and **0.260**. All values indicated more than 0.05. These results suggest that the respondent's course has no effect on them accepting the E-portfolio Objective-Based Instructions. Students on all courses seem to have an equal understanding of the instruction provided for E-portfolio application, whatever their particular course.

Taken together, these results for the first key factor suggest that the documentation for the system's deployment which adopted the objective-based instruction could be comprehended and accepted by students on all courses. Apart from that, there might be a chance that a small number of people in a group can contribute to increase the comprehension of using this system. Due to this, views gained from interviews session are elaborated in the qualitative findings later in this chapter.

Theme 02-Hierachical Instructions

Hierarchical Instructions (HI)	1. Each task has a level of competence to be achieved
	2. I do understand the competency standards that needs to be achieved in the task involved.
	3. I can anticipate the outcome of the assignment by using the 'Plan' function in the E-portfolio

Similar to the previous theme, the median results for this theme indicate that all courses in 2013 and 2014 achieved equal to or above the target score (4.0), which suggests that the participants agreed that the tasks in the E-portfolio instructions had a certain level of competency standard that needed to be achieved. In this theme, HI-03 *(I can anticipate the outcome of the assignment by using 'Plan' function in the E-portfolio)* was the main

question that needed to be investigated due to its aim to find out how far the PLAN function worked during the deployment. The Dressmaker course provided the lowest scores of mean rank in 2013 (11.88) as well as in 2014 (12.00), suggesting that maybe a few respondents were not using the PLAN function provided in the system (Table 5.21 and 5.22). After communicating with the instructors, they admitted that the students found that the PLAN function was quite hard to develop, even though they knew the features were useful for their assignments. For other courses, the scores were acceptable and did not show a substantial difference between courses or years.

Table 5.21 Mean Ranks for 2013 cohort (Theme 02)

ID		N	Mean Rank
HI-01	CS	9	12.61
	KP	13	13.54
	FES	5	17.70
	Total	27	43.85
HI-02	CS	9	14.06
	KP	13	12.62
	FES	5	17.50
	Total	27	44.17
HI-03	CS	9	14.72
	KP	13	18.20
	FES	5	11.88
	Total	27	44.81

Table 5.22 Mean Ranks for 2014 cohort (Theme 02)

ID		N	Mean Rank
HI-01	CS	18	18.33
	FES	4	10.75
	LDG	4	20.50
	ELC	6	12.17
	Total	32	61.75
HI-02	CS	18	17.42
	FES	4	12.25
	LDG	4	18.50
	ELC	6	15.25
	Total	32	63.42
HI-03	CS	18	17.72
	FES	4	12.00
	LDG	4	18.00
	ELC	6	14.83
	Total	32	62.56

Next, a Kruskal Wallis test was conducted to compare the scores of items in Hierarchical Instruction for the 2013 and 2014 cohorts. There was no significant difference in those scores against courses at the $p < .05$ level for the three items, where the p values were **0.420, 0.412 & 0.247** in 2013 and **0.150, 0.612 & 0.561** in 2014. These results suggest that students on all courses have equal agreement regarding the hierarchical characteristics that have been adapted in the E-portfolio process, despite their particular course.

For further investigation, due to the issue of low involvement in PLAN creation and because I consider this feature to be of foremost importance in the E-portfolio process, I intend to find the relationship between the understanding of a task's competency standard with the PLAN development. Thus, to test the relationship between the three items, a Spearman Rho's Correlation was conducted. From Tables 5 and 6 in the Appendix 2, it can be seen that HI-02 *"I do understand the competencies standard need to be achieved in the task involved"* was highly correlated with HI-03 *"I can anticipate the outcome of the assignment by using 'Plan' function in the E-portfolio"* with scores of r=**0.844, n=27, p=0.0** in 2013 and r=**0.952, n=32, p=0.0** in 2014.

This situation suggests that, if a student has a good understanding about the competency standard that must be achieved in a certain task; they also can expect or anticipate the outcome and might use the PLAN function to illustrate it. Thus, it is essential to use a conventional teaching method to strengthen their understanding about competencies in a task prior to the practical lesson.

Theme 03-Progress-Based learning

This theme is very important in the Skills Training pedagogy because most of the students in this programme were trained using chunks of tasks. Therefore, they need to perform and be evaluated based on the work progress as it was as important as the final product.

Progress-Based Learning (PBL)	1. The assignments were assessed individually even if done in a group 2. The assignments were verified upon completion of complete final product/outcome 3. Assignments were also assessed based on the progress of work 4. I do understand that the progress of work is as important as the final product/outcome 5. I do understand that the final product/outcome is very valuable to determine my competency of performance. 6. E-portfolio has helped me to be alert with the progress of my work

The median scores show that most of the items in the Progress-based learning were scored equal to or above target in both the 2013 and 2014 cohorts. However, in the 2013 cohort, PBL-06 *"E-portfolio helped me to be alert with the progress of my work"* only scored 3.0,

which is below target. To investigate this in more detail, the respondents' answers were detailed as shown in Table 5.23 below. From the data, more than a quarter of the respondents (32%) chose 3-Neutral for this item. The CS 2013 (computer system course) was the highest contributor where six out of nine people chose this option. Based on the communication with the class instructor and one respondent from the group, this situation happened because most of them were unaware of the PLAN function so they did not carry out the checklist as required. Thus, they found that the E-portfolio had not done much to encourage the submission of work progress. The student respondent stated that the instructor did not give them much guidance through the process because he was not well trained in using the function. The situation improved in 2014 where 17 of 18 CS 2014 participants chose to agree and strongly agree with the PBL-06 statement. The peer-mentoring seems to have worked, as the students said they were frequently helped by their friends and sometimes by their instructors.

Table 5.23 The frequencies of scores for PBL-06 in both cohorts

| | | PBL 06 - E-portfolio has helped me to be alert with the progress of my work | | | | | |
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	6	3	0	9
	KP 2013	0	0	6	7	0	13
	FES 2013	0	0	3	2	0	5
	CS 2014	0	0	1	11	6	18
	FES 2014	0	0	1	3	0	4
	ELC 2014	0	0	0	2	2	4
	LDG 2014	0	0	2	3	1	6
Total		0	0	19	31	9	59
Percentage (%)		0	0	32	53	15	100

For the Kruskal Wallis test, there was no significant difference in those scores against courses at the p<.05 level for the six items, where the p values are **0.842, 0.516, 0.755, 0.804, 0.769** & **0.631** in 2013 and **0.315, 0.590, 0.160, 0.257, 0.617** & **0.175** in 2014. These results suggest that students on all courses have an equal agreement regarding the progress-

based learning characteristics that have been adapted in the E-portfolio process despite which particular course they are on.

Therefore, from the result, it is indicated that most of the respondents possess a good understanding of the requirement of the skills training programme that is to accomplish each task according to the competency standard outlined. However, to ensure they utilise the function in the E-portfolio that supports this purpose, clear instructions must be explained and the assistance must be provided.

Theme 04-Learning Responsibility

Learning Responsibility (LR)	1. I did insert the progress of work into my E-portfolio account. 2. I also include all materials related to the assignment into my E-portfolio (such as images, video, audio) 3. I always update my assigned task into the E-portfolio 4. I did submit the final outcome of the assignment into my E-portfolio 5. Using E-portfolio, I can organise my reports well

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved above a Neutral score, which suggests that the participants agreed that the use of E-portfolio had improved the responsibility of the student to complete tasks and assigned work. In both the 2013 and 2014 cohorts, the Kruskal Wallis test showed that there was no significant difference between those scores against courses at the $p <. 05$ level for the five items, where the p values are **0.438, 0.293, 0.390, 0.376 & 0.224** in 2013 and **0.209, 0.434, 0.163, 0.148 & 0.276** in 2014. These results suggest that students on all courses have equal agreement on the level of responsibility that needs to be achieved in order to complete the E-portfolio project.

In this theme, I wanted to explore the link between LR-03 and LR-04 to see whether the users keep updating their E-portfolio with their work progress, the chance of making a final submission will increase. Thus, to explore the relationship between the two items, a Spearman Rho's Correlation was conducted. From Tables the result (refer Table 7 and 8 in the Appendix 2), was that LR-03 *"I always update my assigned task into the E-portfolio"* was highly correlated with LR-04 *"I did submit the final outcome of the assignment into*

my E-portfolio" for the 2014 cohort (**0.709, p=0.0**), but for the 2013 cohort the relationship seems weak (**0.594, p=0.0**).

Communication with an instructor and a few students from the 2013 cohort revealed that courses like Dressmaker and Kitchen Practice experienced difficulties in updating the work due to having limited Internet facilities in their classroom and workshop. Compared to the Computer course students, who have their own computer lab, these students totally depend on wireless Internet facilities provided in the resource centre. The low bandwidth of the Internet seems to make updating difficult. However, they said they believe in the E-portfolio as they still uploaded their final works onto their respective page.

The situation has improved for the 2014 cohort where a changed strategy has been put into action. The computer lab was opened for other students to use for three hours per day. During that time, the computer students attended lectures in the lecture hall or stayed in the library and resource centre for a revision session. This allocated time was an opportunity for students from other courses to use computers with more capable and stable Internet facility. Therefore, the important point here is, in order to ensure the students keep executing their learning responsibility to use the E-portfolio for updating and maintaining their pages, sufficient computer and Internet resources must be provided.

Theme 05- Learning reflection

Reflection (REF)	1. I have to do the practical task before creating a report 2. Practical training does help me to supply information for the report 3. Sometimes, I consider my prior knowledge and experience to plan new ideas for the report 4. I like to accept comments from others related to my work 5. I can reflect on my mistakes from others' comments 6. I am aware of my mistakes and make sure they don't happen again 7. E-portfolio helped me to record the assigned task so it can be reviewed by others

One of the E-portfolio objectives is to enhance students' reflection by encouraging them to use the E-portfolio to publish their creativity based on what has been learned. Thus, peers and the instructor could give comments or suggestions, hence promoting knowledge-sharing. A student could also reflect on the comments and suggestions, and then improve

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their work. Prior to the E-portfolio creation, every student must undergo practical training in the lab or workshop in order to perform the hands-on work based on the knowledge that has been taught during lectures. This activity is compulsory, as stated in the E-portfolio process. After completing the practical session, the student has to report all the process on to their pages in the E-portfolio. The artefacts can be a report, images or videos. Then, the instructor has to review and give feedback on the student's work in the 'feedback space' in the system. Comments can also be written by peers if he/she made the work public. This theme is to evaluate the student's process of reflection after going through the activities. This theme is important to prove that the E-portfolio could help the participants to gain knowledge by reflecting on their work.

The median values showed that all courses scored equal or above target: in 2013, REF-01 and REF-02 scored 5 while the rest of the items scored 4. In 2014, all items scored 4. However, the most important target is the REF-07 *"E-portfolio helped me to record the assigned task so it can be reviewed by others"* where it scored 4.0 in both cohorts, which is a satisfactory result indicating that an E-portfolio could be a medium to assist students to record their work and obtain reviews from others.

Meanwhile, for the Kruskal Wallis test, there was no significant difference between those scores against courses at the $p < .05$ level for the seven items in both of the cohorts, where the p values are **0.721, 0.785, 0.150, 0.625, 0.967, 0.634 & 0.528** in 2013 and **0.151, 0.123, 0.110, 0.617, 0.721, 0.348 & 0.276** in 2014. These results suggest that all courses have equal agreement on the E-portfolio objectives providing a space to record and publish the work, sharing knowledge and for self-reflection.

Theme 06-Knowledge Construct

Knowledge Construct (KC)	1. I like to seek information through the Internet 2. I did insert materials from the Internet into my E-portfolio 3. E-portfolio creates a workspace between me and group members 4. E-portfolio has helped me to comprehend my task that had been assigned to me in a group

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved the target (4.0 and above), which suggests that the participants were agreed that the use of the E-portfolio had helped them to construct new skills and knowledge during the training course.

Table 5.24 Mean Ranks for 2013 cohort (Theme 06)

ID		N	Mean Rank
KC-01	CS	9	12.00
	KP	13	14.00
	FES	5	17.60
	Total	27	43.60
KC-02	CS	9	12.61
	KP	13	14.38
	FES	5	15.50
	Total	27	42.50
KC-03	CS	9	12.94
	KP	13	14.00
	FES	5	15.90
	Total	27	42.84
KC-04	CS	9	14.00
	KP	13	13.19
	FES	5	16.10
	Total	27	43.29

Table 5.25 Mean Ranks for 2014 cohort (Theme 06)

ID		N	Mean Rank
KC-01	CS	18	18.89
	FES	4	9.25
	LDG	4	20.75
	ELC	6	11.33
	Total	32	60.22
KC-02	CS	18	18.39
	FES	4	11.75
	LDG	4	17.25
	ELC	6	13.50
	Total	32	60.89
KC-03	CS	18	19.50
	FES	4	9.00
	LDG	4	17.63
	ELC	6	11.75
	Total	32	57.88
KC-04	CS	18	18.72
	FES	4	11.00
	LDG	4	20.25
	ELC	6	11.00
	Total	32	60.97

From Tables 5.24 and 5.25 above, the obvious difference can be seen in the CS course where they scored a mean rank average of 12.89 in 2013 which increased to 18.87 in 2014. According to the instructor via FB communication, this situation happened because of the strategy change to 'peer-mentoring' 2014. The students seem motivated to participate with the assistance of their colleagues, and with more exemplars provided. On the other hand, the Dressmaker course showed a decrease in mean rank, which is quite worrying. From a

mean rank average of 16.27 in 2013, it went down to 10.25 in 2014. This situation has been referred to the course instructor and she admitted that, for 2014, the task was given individually due to having fewer participants in the class (only 4 people). Thus, working alone while using this system is not a good approach because there is less motivation from peers and the students felt that it was a lonely process and hard to think without input from others. The one and only mentor they have, also seems not so helpful due to her commitment to accomplish her own task.

Meanwhile, for the Kruskal Wallis test, there was no significant difference in those scores against courses at the $p < .05$ level for the four items in both of the cohorts, where the p values are **0.394, 0.761, 0.777 & 0.741** in 2013 and **0.067, 0.439, 0.078 & 0.096** in 2014. These results suggest that students on all courses have equal agreement on the E-portfolio process that supports the knowledge and skills constructed from activities like searching for materials through the Internet, placing the materials gained on to the E-portfolio, having a group task and working in a group to mutually achieve the task objectives.

The essential items in this theme were KC-03 and KC-04, which provide feedback about the impact of one of the features in the E-portfolio process. Tables 5.26 and 5.27 show that 68% of participants in both years chose 4 and above for KC-03, while for KC-04 71% of them did.

Table 5.26 The frequencies of scores for KC-03

		KC 03 -E-portfolio creates a workspace between me and group members					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	3	4	2	9
	KP 2013	0	0	4	5	4	13
	FES 2013	0	0	1	2	2	5
	CS 2014	0	0	3	9	6	18
	FES 2014	0	0	3	1	0	4
	ELC 2014	0	0	1	2	1	4
	LDG 2014	0	0	4	1	1	6
Total		0	0	19	24	16	59
Percentage (%)		0	0	32	41	27	100

Table 5.27 The frequencies of scores for K-04

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		KC 04 -E-portfolio has helped me to comprehend my task that had been assigned to me in a group					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group pf Student	CS 2013	0	0	2	5	2	9
	KP 2013	0	0	4	5	4	13
	FES 2013	0	0	4	1	1	6
	CS 2014	0	0	2	12	4	18
	FES 2014	0	0	2	2	0	4
	ELC 2014	0	0	1	1	2	4
	LDG 2014	0	0	3	3	0	6
Total		0	0	18	29	13	60
Percentage (%)		0	0	31	49	22	102

In this theme, I also wanted to explore the link between KC-01 and KC-02 to see whether the users' tendency to search for information related to their tasks on the Internet would increase the chance of them inserting those materials into their E-portfolio. Thus, to explore the relationship between the two items, a Spearman Rho's Correlation was conducted. From Tables 9 and 10 (Appendix 2), it is indicated that KC-01 *"I like to seek information through the Internet"* was highly correlated with KC-02 *"I did insert materials from the Internet into my E-portfolio"* for both years: 2013 (**0.830, p=0.0**) and 2014 (**0.825, p=0. 0**)

The key point here is that a group task is much more promising to help users engage with the system. The peer mentoring also seems to help maintain user motivation throughout the session. The E-portfolio process also effectively assists the students to comprehend the work task and creates a workspace for group work. Finally, the correlation suggests that, if a user is frequently searching for information on the Internet, the likelihood that they will insert the suitable materials into their E-portfolio is high. Thus, instructors planning the learning activities must consider allocating adequate time for the students to seek materials through the Internet.

Theme 07-Learning Motivation

Learning Motivation (LM)	1. Having a group assignment has improved my motivation to learn
	2. E-portfolio enhances my motivation to accomplish the group assignment
	3. E-portfolio has helped me to accomplish my assignment
	4. I think the E-portfolio is a good tool to be deployed during training sessions

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved above a Neutral score, which suggests that the participants agreed that activities supported in the E-portfolio process had improved their learning motivation to complete tasks and assigned work. In both the 2013 and 2014 cohorts, the Kruskal Wallis test showed there was no significant difference in those scores against courses at the $p <. 05$ level for the four items, where the p values are **0.500, 0.487, 0.920 & 0.413** in 2013 and **0.237, 0.411, 0.453 & 0.148** in 2014. These results suggest that students on all courses have equal agreement concerning the E-portfolio processes' impacts on the students' motivation to accomplish assigned tasks.

In this theme, I also wanted to explore the relationship between LM-01 and LM-02 to see whether using the E-portfolio to manage the group work had improved the users' motivation. Thus, to explore the relationship between the two items, a Spearman Rho's Correlation was conducted. From Tables 11 and 12 (Appendix 2), it is indicated that LM-01 *"Having a group assignment has improved my motivation to learn"* was highly correlated with LM-02 *"E-portfolio enhances my motivation to accomplish the group assignment"* for both 2013 (**0.947, p=0.0**) and 2014 cohorts (**0.922, p=0. 0**).

The key point here is a group assignment could potentially enhance the student's motivation to accomplish the task. When communicating with one of the students, she admitted that the group task had developed her confidence to use the E-portfolio because her teammates could comment and give advice on her work to improve the outcome. This situation suggests that the E-portfolio process could enhance the student's motivation to learn by helping them gather virtually in the online space.

Theme 08- Social and private learning

Social and Private Learning (SPL)	1. I do understand that the result of group work involves cooperation from all members of the team
	2. E-portfolio has helped me to communicate with peers
	3. E-portfolio has helped me to communicate with instructors
	4. E-portfolio has a privacy function to limit the work that I don't want to share with others
	5. E-portfolio allows me to choose whoever I want to view my work
	6. I like the privacy function provided in the E-portfolio

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved equal to or above the target score, which is 4 and above. Thus, it is suggested that the participants agreed that activities supported in the E-portfolio process could support their social and private learning throughout the period. In both the 2013 and 2014 cohorts, the Kruskal Wallis test showed there was no significant difference in those scores against courses at the $p <. 05$ level for the six items for both cohorts, where the p values are **0.631, 0.634, 0.557, 0.273, 0.759** & **0.352** in 2013 and **0.251, 0.115, 0.901, 0.128, 0.671** & **0.074** in 2014. These results suggest that students on all courses have equal agreement about the E-portfolio processes which support communication with peers and instructors, provide the privacy function and allow group work through the Forum application.

However, to explore this key theme further, from the mean rank values (Tables 5.28 and 5.29), the SPL-01 "*I do understand that the result of group work involves cooperation from all members of the team*" scored the lowest for both years (41.17 in 2013, 59.33 in 2014). This situation was queried with three of the students via the Facebook messaging application. Two of them mentioned that the situation might occur due to some of their group members not contributing much to the group work, thus making the other members feel frustrated and unsatisfied. However, the other respondent mentioned that the result will be evaluated independently by the instructor, so even though a student is a member in an active/competent group, it does not mean that he/she will get the same marks as another member. It depends on individual performance and contribution to the group work. The SPL-04 and SPL-06 in both cohorts showed among the highest values, which suggest that

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the participants prefer the privacy function available in the system. They feel secure to keep their work in there and free to choose who can view their work.

The other essential items in this theme were SPL-02 and SPL-03, which provide feedback about the impact of one of the features in the E-portfolio process. Tables 5.30 and 5.31 show that 92% of participants of both years chose 4 and above for SPL-02, while for SPL-03 100% of them did. This situation suggests that the E-portfolio activities did support the communication with peers and the instructor.

Table 5.28 Mean Ranks for 2013 cohort (Theme 08)

ID		N	Mean Rank
SPL-01	CS	9	15.50
	KP	13	13.77
	FES	5	11.90
	Total	27	41.17
SPL-02	CS	9	13.17
	KP	13	13.62
	FES	5	16.50
	Total	27	43.28
SPL-03	CS	9	15.50
	KP	13	12.62
	FES	5	14.90
	Total	27	43.02
SPL-04	CS	9	13.00
	KP	13	12.85
	FES	5	18.80
	Total	27	44.65
SPL-05	CS	9	14.89
	KP	13	13.15
	FES	5	14.60
	Total	27	42.64
SPL-06	CS	9	13.83
	KP	13	12.46
	FES	5	18.30
	Total	27	44.59

Table 5.29 Mean Ranks for 2014 cohort (Theme 08)

ID		N	Mean Rank
SPL-01	CS	18	18.17
	FES	4	11.50
	LDG	4	11.50
	ELC	6	18.17
	Total	32	59.33
SPL-02	CS	18	17.83
	FES	4	11.38
	LDG	4	21.75
	ELC	6	12.42
	Total	32	63.38
SPL-03	CS	18	16.33
	FES	4	15.00
	LDG	4	19.00
	ELC	6	16.33
	Total	32	66.67
SPL-04	CS	18	18.08
	FES	4	10.25
	LDG	4	22.00
	ELC	6	12.25
	Total	32	62.58
SPL-05	CS	18	17.19
	FES	4	14.50
	LDG	4	18.38
	ELC	6	14.50
	Total	32	64.57
SPL-06	CS	18	17.42
	FES	4	13.25
	LDG	4	24.63
	ELC	6	10.50
	Total	32	65.79

Table 5.30 The frequencies of scores for SPL-02

		SPL 02- E-portfolio has helped me to communicate with peers					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	1	6	2	9
	KP 2013	0	0	1	9	3	13
	FES 2013	0	0	0	3	2	5
	CS 2014	0	0	1	12	5	18
	FES 2014	0	0	1	3	0	4
	ELC 2014	0	0	0	2	2	4
	LDG 2014	0	0	1	5	0	6
Total		0	0	5	40	14	59
Percentage (%)		0	0	8	68	24	100

Table 5.31 The frequencies of scores for SPL-03

		SPL 03- E-portfolio has helped me to communicate with Instructors					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	0	5	4	9
	KP 2013	0	0	0	10	3	13
	FES 2013	0	0	0	3	2	5
	CS 2014	0	0	0	12	6	18
	FES 2014	0	0	0	3	1	4
	ELC 2014	0	0	0	2	2	4
	LDG 2014	0	0	0	4	2	6
Total		0	0	0	39	20	59
Percentage (%)		0	0	0	66	34	100

The key point here is that the E-portfolio seems to work to support communication with colleagues and the instructor. The privacy setting was also likely to attract users' attention. Thus, it is suggested that the E-portfolio process could support the social and private learning during the training course.

Theme 09-Unique learning Style

Unique learning style (ULS)	1. I think I like to use this E-portfolio during training 2. I feel this system is difficult to use somehow 3. I am more confident to use E-portfolio with my peers 4. I prefer using E-portfolio on campus 5. I prefer using E-portfolio off campus 6. I like to use E-portfolio individually (alone)

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved equal or above the target score, which is 4 and above, except ULS-05 *"I prefer using E-portfolio off campus"* and ULS-06 *"I like to use E-portfolio individually (alone)"*. Thus, it is suggested that the participants were agreed that activities included in the E-portfolio process could support their social and private learning throughout the session where they prefer to use this system with their colleagues while on campus rather than independently at home or in their hostel. In both the 2013 and 2014 cohorts, the Kruskal Wallis test showed there was no significant difference in those scores against courses at the $p < .05$ level for the four items (excluding ULS-05 and ULS-06) for both cohorts. These results suggest that students on all courses have equal agreement regarding the individual manner of using the E-portfolio despite their particular course.

From Table 5.32 below it is shown that 82% of the participants chose 4 and above when thinking about whether they like to use the E-portfolio during the course. In Table 5.33, 65% of the users feel the system is difficult to use, while 28% of them chose Neutral, which assumed 28% of the participants experienced confusion between choosing either it is easy or challenging to use the system. Seven percent disagreed with the statement and it can be assumed that these users might feel the system is easy to use.

Table 5.32 The frequencies of scores for ULS-01

		ULS-01 I think I like to use this E-portfolio during training					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group Of Student	CS 2013	0	0	2	4	3	9
	KP 2013	0	0	2	9	2	13
	FES 2013	0	0	0	3	2	5
	CS 2014	0	0	3	10	5	18
	FES 2014	0	0	2	2	0	4
	ELC 2014	0	0	0	2	2	4
	LDG 2014	0	0	2	4	0	6
Total		0	0	11	34	14	59
Percentage (%)		0	0	19	58	24	100

Table 5.33 The frequencies of scores for ULS-02

		ULS-02 I feel this system is difficult to use somehow					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group Of Student	CS 2013	0	0	4	5	0	9
	KP 2013	0	2	3	8	0	13
	FES 2013	0	0	2	3	0	5
	CS 2014	0	1	4	10	3	18
	FES 2014	0	0	1	3	0	4
	ELC 2014	0	1	0	2	1	4
	LDG 2014	0	0	3	3	0	6
Total		0	4	17	34	4	59
Percentage (%)		0	7	28	58	7	100

Online communication with some of the users was conducted to explore why most of them chose to say that the system is hard to use, but at the same time the majority of them preferred to use it during the training course. Most of them mentioned that they realised that the system could improve their skills in operating a computer and exploring information through the Internet. However, as this is their first electronic learning application, it has taken a little longer to master the steps. They still depend on the manual guide every time they use the system. It is not as easy as creating an email or Facebook account. They felt that the system is packaged with the responsibility to accomplish the given task, and thus the pressure makes them feel uneasy. Compared to the social web, which is just for fun and socialising, this system has been developed in association with the learning objectives, therefore struggling to meet the deadlines made them a bit stressed. Nonetheless, they admitted that the peer-mentoring approach has helped them to complete a few tasks faster.

Thus, the key point that could be derived from this theme is that, although the system seems to be challenging, the students are interested in using it throughout the course. They prefer to use it with peers during campus hours as this support could enhance their motivation and confidence to complete the task assigned in the E-portfolio.

Theme 10-Instructor Engagement

Instructor Engagement (IE)	1. The instructor looks expert by using an E-portfolio 2. I did understand what has been taught about E-portfolio by the instructor 3. My instructor always assists me when having problems during E-portfolio deployment 4. I contact my instructor immediately if there is a problem occurs 5. I also contact the system admin to seek for a solution 6. Overall, I am satisfied with the assistance provided during the usage of the system.

The median scores indicate that all courses in the 2013 and 2014 cohorts achieved equal to or above the target score, which is 4 and above. Thus, it is suggested that the participants confirmed that the instructors were involved and engaged with the system along with the sessions. In both the 2013 and 2014 cohorts, the Kruskal Wallis test showed there was no significant difference in those scores against courses at the $p <. 05$ level for the six items for both cohorts. These results suggest that students on all courses have equal agreement concerning the instructors' engagement with the system as well as the role of the system's admin to provide assistance when needed. However, when exploring the percentiles in the descriptive statistics of both cohorts, IE-02, IE-4 and IE-05 seem to have an issue where the first quarter of percentiles are below target (Tables 5.34 and 5.35).

Table 5.34 The Percentiles of scores for the 2013 cohort (Theme 10)

	N	Percentiles
		25th	50th (Median)	75th
IE-01	27	4	4	5
IE-02	27	3	4	5
IE-03	27	4	4	4
IE-04	27	4	4	4
IE-05	27	3	4	5
IE-06	27	4	4	4

Table 5.35 The Percentiles of scores for the 2014 cohort (Theme 10)

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	N	Percentiles		
		25th	50th (Median)	75th
IE-01	32	4.00	4.00	4.00
IE-02	32	3.25	4.00	4.00
IE-03	32	4.00	4.00	4.00
IE-04	32	3.25	4.00	4.00
IE-05	32	3.00	4.00	4.75
IE-06	32	4.00	4.00	4.00

Due to this situation, I put the frequencies of the three items into tables so the values can be seen clearly. From Table 5.36 below, it is shown that 25% of the participants chose 3, which is an undecided preference on the understanding of E-portfolio information provided by the instructor. Meanwhile, 24% of them chose Neutral for IE-04 and 31% for IE-05 (Tables 5.37 and 5.38). This situation suggests that the participants seem undecided about requesting assistance from both instructor and system administrator.

Table 5.36 The frequencies of scores for IE-02

		IE-02. I did understand what has been taught about E-portfolio by the instructor					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	2	4	3	9
	KP 2013	0	0	5	6	2	13
	FES 2013	0	0	0	3	2	5
	CS 2014	0	0	5	8	5	18
	FES 2014	0	0	2	2	0	4
	ELC 2014	0	0	0	2	2	4
	LDG 2014	0	0	1	5	0	6
Total		**0**	**0**	**15**	**30**	**14**	**59**
Percentage (%)		**0**	**0**	**25**	**51**	**24**	**100**

Table 5.37 The frequencies of scores for IE-04

		IE-04. I contact my instructor immediately if there is a problem occurs					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	2	6	1	9
	KP 2013	0	0	3	8	2	13
	FES 2013	0	0	1	3	1	5
	CS 2014	0	0	4	11	3	18
	FES 2014	0	0	1	3	0	4
	ELC 2014	0	0	1	2	1	4
	LDG 2014	0	0	2	4	0	6
Total		0	0	14	37	8	59
Percentage (%)		0	0	24	63	14	100

Table 5.38 The frequencies of scores for IE-05

		IE-05. I also contact the system admin to seek for a solution					
		Strongly Disagree	2	3	4	Strongly Agree	Total
Group of Student	CS 2013	0	0	3	2	4	9
	KP 2013	0	0	4	7	2	13
	FES 2013	0	0	1	2	2	5
	CS 2014	0	0	5	7	6	18
	FES 2014	0	0	2	2	0	4
	ELC 2014	0	0	1	1	2	4
	LDG 2014	0	0	2	4	0	6
Total		0	0	18	25	16	59
Percentage (%)		0	0	31	42	27	100

Based on communication with participants, a few of them admitted that they did not completely understand the E-portfolio execution during the early stage. This is because some of them were unaware about any kind of e-learning, and thus this sudden implementation made them hesitant to try something new. Some of them observed that their instructors were not totally adept at using the system, and thus the explanation provided seemed vague and unclear. The IE-04 reflected that this circumstance was due to the instructors seeming unable to provide sufficient help, as the students chose not to refer to them. When asked why they did not email or contact me directly as the system admin via Facebook, they gave excuses such as lack of time, they had forgotten the email address

or they did not have a chance to keep updating their Facebook. When I communicated with the instructors, they admitted their lack of knowledge and skills about this system, but stated that they had tried very hard to organise several sessions on introduction to the E-portfolio and making use of the manual to help the students develop their account. The instructors stated that there were isolated cases of students who always gave excuses and hesitated to get involved in the session. However, they managed to complete the session, even though they faced many obstacles along the project duration.

The key point here is that most of the participants seem satisfied with the instructors' engagement with the application, even though there were a few cases who were undecided. The communication revealed that the instructors have issues in mastering the system, and this thus impacts the students' confidence to continue using the system.

5.9 Summary of Quantitative Findings

The quantitative findings, which were obtained from the evaluation rubrics and the survey questionnaires, could be summarised as follows:

1. From the evaluation rubrics, it was found that knowledge and skills could be constructed through the deployment of the E-portfolio during module training. Skills such as IT skills were demonstrated through the accomplishment of an online report with improved structures and formats. The rubrics additionally showed that the E-portfolio was supporting the progress-based learning approach where students were asked to submit the stages of their work according to the plan. The communication between students and peers as well as with the instructor also seems to have improved because the tasks were assigned based on groups, thus encouraging students to collaborate with each other during the session.

2. The questionnaires have shown results in several areas, such as the E-portfolio benefits, the correlation between selected significant items, the differences of use between courses and other results that seem useful to be included as findings.

   a. The computer and Internet literacy statistics in section 5.8.2.3 showed that the computer students were more literate than those on the other courses in both

computer and Internet proficiency skills. However, the result of the questionnaires on each theme showed that no differences were detected through the significance test. Despite the courses on which they were studying, all students accepted the E-portfolio process similarly. It is suggested that possessing existing computer or Internet skills does not influence the students' use of the E-portfolio during the training.

b. All essential variables that represent the objectives of E-portfolio implementation show a minimum target of 4, which is 'Agree'. Thus, it is suggested that the target for this implementation has been achieved through the result of this questionnaire, where:

   a. The E-portfolio process does support the progress-based learning
   b. The E-portfolio process does support the learning reflection
   c. The E-portfolio process does support the knowledge construction
   d. The E-portfolio process does support the social communication
   e. The E-portfolio process does increase the learning motivation
   f. The E-portfolio process does increase the learning responsibility

c. In addition to the main findings which focused on the discovery of the E-portfolio process evaluation and the differences between courses, this analysis has also revealed more information related to the E-portfolio use. The information was obtained from the correlation test of a few items of the questionnaire to see the relation between them as well as through the communication with the participants via online messaging during the implementation session. The information is as follows:

   i. The documentation of the system's deployment process that adopted the objective-based instruction and the hierarchical instructions could be understood and accepted by students on all courses.

   ii. From the correlation test, it was found that if a student had a good understanding about the competency standard that must be achieved in a certain task, he or she also could expect or anticipate the outcome and might use the PLAN function to illustrate it. Thus, it is essential to utilise a

conventional teaching method to strengthen students' understanding about competencies in a task prior to the practical lesson.

iii. In order to ensure that the students keep executing their learning responsibility to use the E-portfolio for updating and maintaining their pages, sufficient computer and Internet facilities must be provided.

iv. Is it suggested that (from the correlation test results), if a user is frequently searching for information on the Internet, there is a high chance that they are going to insert suitable materials into their E-portfolio. Thus, when planning the learning activities, the instructors must consider allocating adequate time for the students to seek materials through the Internet.

v. In addition, to ensure that students utilise the function in the E-portfolio that supports this purpose, clear instructions must be explained and the proper assistance must be provided.

vi. The peer mentoring also seemed to help improve and maintain the users' motivation throughout the session.

vii. The E-portfolio process also effectively assisted the students to comprehend the work task and created a workspace in the group work where a group task/assignment was much more promising to help users engage with the system. It is believed that the group assignment could enhance the students' motivation and confidence to accomplish the task. Students prefer to participate in group tasks with their peers during campus hours, as this support could enhance their motivation and confidence to complete the task assigned in the E-portfolio. Ultimately, most of the participants chose to continue using the system even after the project ended.

viii. Finally, the communication revealed that the instructors had issues in mastering the system, which thus impacted on the students' confidence to continue using the system. Thus, to ensure the students sustain the implementation, the instructors' skills need to be updated and improved.

5.10 Introduction

These findings are the compilation of all interviews and communications through email, online messaging and Facebook postings, with selected representative quotes from that data. The data collection for the qualitative part was scheduled from May 2013 to September 2014 and involved 27 respondents, who were the principals, students and instructors. The respondents' details are explained in the Chapter 6 Research analysis and discussion. Table 5.40 shows the details of the respondents who were interviewed, while Table 5.41 elaborates the coding system that has been used in the quotes for the data analysis.

Table 5.40 The details of the participant Interview sessions

Respondent	Respondent Code	Cohort	Medium of Interview	Number of Respondents
Student	*Student01 – Student07*	2013	Facebook or Email	7 (appointed)
Instructor	*Instructor01- Instructor02*	2013	Facebook or Email	2 (appointed)
Student	*Student08- Student13*	2013	Facebook Posting	*6 (random)
Student	*Student14- Student19*	2014	Facebook or Email	6 (appointed)
Student (mentors)	*Student20- Student21*	2014	Facebook	2 (appointed)
Instructor	*Instructor02- Instructor06*	2014	Facebook or Email	5 (appointed)
Principal	*Principal01*	2014	Email	1
TOTAL				****28 people = 24 Transcripts**

*6 people commenting is one transcript
** One of the instructors was interviewed in both the 2013 and 2014 cohorts.
*** Further details on respondents' gender and course can be found in Appendix 3.

Table 5.41 Example of coding system assigned to the respondents

Year	Designation	Course	Gender	Code No	Coding
2013	Student	Computer System (CS)	Female	01	*Student01, CS, 2013, Female)*
2013	Instructor	Kitchen Practice (KP)	Female	01	*Instructor01, KP, 2013, Female)*
2014	Student	Dressmaker (FES)	Female	16	*Student16, FES, 2014, Female)*
2014	Instructor	Electrical (ELC)	Male	05	*Instructor05, ELC, 2014, Male)*

5.10.1 Data Analysis

Providing a transparent explanation of the analytical process involves being clear about its different stages. Principally, the analysis begins as soon as data are collected and the researcher starts creating and synthesising ideas; however, there will usually be a time when more systematic analysis is carried out (Creswell & Miller, 2010). Qualitative data do not come neatly sorted and labelled and, at the beginning of this more formal analytical stage, the researcher is faced with an abundance of material. This may take the form of extensive documents, transcripts, photographs or videos. Thus, the researcher must find a way to handle these data. Therefore, data management is the first key task in the analytical process (Ritchie & Spencer, 2004). This stage involves a careful review of the data, and then a rigorous process of sorting, sifting and reduction so that the researcher can move on to a more creative stage of interpretation, making sense of the findings and producing descriptive and explanatory accounts.

There are many different approaches to data management. In some cases, the researcher treats the data themselves as the phenomena under study rather than as being indicative of beliefs and experiences which exist outside the research setting (Creswell & Clark, 2011). On the other hand, the researcher can treat the data as a window onto people's social worlds

and be more concerned with substantive meanings. In this case, the analyst might cut down phrases to their essential meaning (as in phenomenological approaches), or alternatively he or she might sort, synthesise and compare data under a common set of concepts or themes (Ritchie & Spencer, 2004). I chose to use the manual process of data analysis using the thematic approach. I was inspired by the analytical tool called 'Framework' that was developed at the National Centre for Social Research in the 1980s for the conduct of qualitative studies within the social policy enquiry (Ritchie & Spencer, 1994). It is essentially a data management tool, but it can also be used to aid later, more interpretative, stages of analysis.

Framework is a matrix-based method which uses a thematic framework to categorise and organise data according to key themes, concepts and emergent categories. Individual studies each have their own thematic framework, comprising a series of main themes, sub-divided by a succession of related sub-topics. These evolve and are refined through familiarisation with the raw data and through tagging or labelling these in some way. The steps involved in this approach are as follows (Ritchie & Spencer, 2004):

1. Identifying initial themes or concepts
2. Labelling or tagging the data
3. Creating thematic charts to sort and order the data
4. Summarising or synthesising the data

In this research, 24 transcripts were analysed. To analyse the data from all sources of qualitative methods such as email interviews, FB postings, FB communication and survey questionnaires, the pre-determined codes were listed and put into matrices. Before that, I referred back to the research questions based on the research aim that motivated the execution of qualitative exploration. The questions that need to be answered are as follows:

1. *What role does the E-portfolio play in the learning and training environment?*
2. *In what ways could the E-portfolio process contribute to the implementation of the E-portfolio system in the learning and training environment?*
3. *What are the benefits of E-portfolio implementation in the Skills Training Programme?*

4. *What issues and challenges have been raised by implementing the E-portfolio in the skills training programme?*

5. *What are the success factors of E-portfolio implementation in the learning and training environment?*

Identifying themes or concepts

The themes were generated based on the research questions that need to be addressed. The themes identified are the E-portfolio purposes/functions, E-portfolio process deployment, E-portfolio benefits/advantages, E-portfolio issues and challenges and, finally, the E-portfolio success factors.

Labelling or tagging the data

The labelling and tagging process was performed manually using the observation and familiarisation process through each transcript. Data obtained from the email interviews, FB postings, FB communication and survey questionnaires were printed on paper. I used highlighter pens in five different colours to tag the 24 printed transcriptions. The colour codes used were: Blue – E-portfolio purpose/function, Green – E-portfolio process, Yellow – E-portfolio benefits, Red – E-portfolio issues and challenges, and Orange – E-portfolio success factors.

Creating thematic charts to sort and order the data

After all keywords had been tagged, I transferred each one with its quotation on to the computer. Those quotes were entered into a table based on their themes. The process of insertion was done by reviewing one transcript after another. An example of the thematic charts before the sorting process is as follows (Table 5.42):

Table 5.42 Sample of Thematic Charts before Sorting

Themes	Sources	*Keyword*	Quotes from passages
Purpose/ Function (Blue)	FB Communication (Student02, CS, 2013, Male)	*Backup*	"I keep my files in the E-portfolio as my secondary backup if my hard disk got fails"
		Communicate	"I can give the message to my instructors using the messaging system…"
	FB Communication (Student02, CS, 2013, Male)	*Backup*	"I save the same files in my pages. It will be my backup storage…"
	FB Communication (Student17, ELC, 2014, Male)	*Assessment*	"Student can put their work to be evaluated by the teacher. It's like online evaluation…"
Themes	Sources	*Keyword*	Quotes from passages
Process (Green)	FB Posting	*Manual*	"I use the manuals provided. However, there are certain parts I couldn't understand and need help from my instructor"
		Communicate	"I can give the message to my instructors using the messaging system…"
		Insert materials	"Yes, I insert the pictures too…"
	FB Communication (Student02, CS, 2013, Male)	*Insert materials*	"I put the assignment on to my pages so the instructor could review and comments"
	FB Communication (Student17, ELC, 2014, Male)	*Manual*	"Yes. I did refer the manual…Yes, it helps a lot"
Themes	Sources	*Keyword*	Quotes from passages
Benefits (Yellow)	FB Posting	*Save files*	"it can save my files in case it gets lost in my portfolio file or in the computer"

Themes	Sources	Keyword	Quotes from passages
		Communicate	"I can give the message to my instructors using the messaging system..."
	FB Communication (Student02, CS, 2013, Male)	*Communicate*	"I think this system also can improve the communication and relation between students and the instructors."
	FB Communication (Student17, ELC, 2014, Male)	*Save cost*	"I don't have to print the assignment many times. Just print the final one to put into the Portfolio file... it saves printing cost"
Themes	Sources	*Keyword*	Quotes from passages
Issues (Red)	FB Posting	*Attitude*	"Not all students give attention. It's not fair…"
	FB Communication (Student02, CS, 2013, Male)	*Facilities*	"The Internet is totally slow. We need to wait longer to upload or download something."
	FB Communication (Instructor05, ELC, 2014, Male)	*Facilities*	"I have a laptop, so not a problem for me. But, some of my students, they need to do it in the computer lab…"
Themes	Sources	*Keyword*	Quotes from passages
Success Factors (Orange)	FB Posting (Student11, KP, 2013, Male)	*Attitude*	"If they could give cooperation, I think the system will be deployed by everyone in the class..."
	FB Communication (Student02, CS, 2013, Male)	*Facilities*	"The hardware and software must be sufficient to cater for the student's requirement"
	FB Communication (Student17, ELC, 2014, Male)	*Facilities*	"I think if the library could have more computers and the Wi-Fi in the student hall is enhanced, we can give more focus and commitment"

Then, each table was reviewed and a sorting process was conducted to accumulate the same keywords together. The final sorting process yields a map as shown in Figure 5.17

After the sorting process was completed, the data were then ordered so that any redundancy could be identified and reduced. The keywords and quotes were rearranged according to their suitability and logic (Spencer et al., 2003). After being well arranged, the themes and sub-themes were recognised and prepared to be summarised and synthesised. Table 5.43 shows the themes and sub-themes of this research in rank order of word counts that appear in the data. For example, in Theme 1; 'Purpose', four sub-themes emerged which are 'Personal Compilation', 'Teaching and Learning', 'Alternate Storage' and 'Social Medium'. The sub-theme of 'Personal Compilation' comprised a few keywords such as compilation, records, achievement, collection and showcase. This sub-theme contributed 35% of the total sub-themes in Theme: Purpose. Meanwhile, the sub-theme 'Teaching and Learning' included keywords like assessment, teaching materials, online learning and evaluation. These keywords in this sub-theme represented 29% of the total sub-themes. The third sub-theme which was 'Alternate Storage' had keywords like storage, backup, softcopy and safekeeping that contributed 19% of all sub-themes. The last sub-theme which was 'Social Medium' included keywords such as Facebook, communication, social media and social connection covered 17% of all sub-themes.

PURPOSE

Backup   Communication   Showcase   Assessment   Teaching materials
collection

Social connection Online learning

PROCESS

Manual   Insert materials   PLAN function   Work progress   Final work   Practical task

Competencies   Peer-coaching   Product   Responsibility   Groupwork

Computer skills   Reflection

BENEFITS

Backup   Communication   Save cost   Motivation   Computer skills   Recognition

Work progress   Groupwork   Reflection   Knowledge

ISSUES

Skills   Facilities   Supports   Training   Assistance   Admin

Attitude   Instructors   Software   Technical   Internet

Hardware

SUCCESS FACTORS

Facilities   Attitude   Supports   Training   Assistance   Management

Peer coaching   Instructors   Software   Technical   Process of use

Admin   Save Cost

Figure 5.13 Keywords that emerged after the sorting process

Table 5.43 The themes and sub-themes derived from the qualitative methods based on percentage of words count

	Themes and Sub-themes	%
1.0	**What role does the E-portfolio play in the learning and training environment? (Purpose)**	
1.1	**Personal Compilation**	**35%**
1.2	**Teaching and Learning**	**29%**
1.3	**Alternate Storage**	**19%**
1.4	**Social Medium**	**17%**
2.0	**In what ways could the E-portfolio process contribute to the implementation of the E-portfolio system in the learning and training environment? (Process)**	
2.1	**The "progress-based" instructional design**	**23%**
2.2	**The Groupwork/ Collaborative learning**	**19%**
2.3	**The Instructor-led deployment**	**16%**
2.4	**The Peer mentoring**	**15%**
2.5	**A Practical task reflection**	**15%**
2.6	**A Reflection on feedback**	**12%**
3.0	**What are the benefits of E-portfolio implementation in the skills training programme? (Benefits)**	
3.1	**Improves communication with instructor and peers**	**24%**
3.2	**Improves student's effort of accomplishing tasks**	**23%**
3.3	**Aids acquisition of new knowledge and skills of IT**	**21%**
3.4	**Recognition from awarding body**	**19%**
3.5	**Save cost**	**13%**
4.0	**What issues and challenges have been raised by implementing the E-portfolio system in the skills training programme? (Issues)**	
4.1	**Personal attitude**	**34%**
4.2	**The Instructor's support**	**23%**
4.3	**Physical facilities**	**16%**
4.4	**Technical and system support**	**15%**
4.5	**Management encouragement**	**7%**
4.6	**User's previous IT proficiency**	**5%**
5.0	**What are the success factors of E-portfolio implementation in the learning and training environment? (Success Factors)**	
5.1	**E-portfolio function and process**	**31%**
5.2	**Institutional Support**	**30%**
	5.2.1 Instructor engagement	(10%
	5.2.2 Peer mentoring	7%
	5.2.3 Management enforcement	2%
	5.2.4 Training and workshop	11%)
5.3	**Facilities and requirement**	**22%**
	5.3.1 Cost-effective hardware and software	(6%
	5.3.2 Established Internet line	16%)
5.4	**Technical assistance**	**17%**

5.10.2 Summarising or synthesising the data

After the completion of the three steps of the analysis, the data ultimately were summarised and synthesised to produce meaningful findings. Based on Table 5.43 above, the summary of findings is explained with a few samples of significant quotations from the respondents.

Theme 1 – E-portfolio function and role

In response to the question *"What role does the E-portfolio play in the learning and training environment?"*, I have gained many different perspectives and views from a range of respondents. Some of the students (8 out of 19) and instructors (4 out of 6) mentioned that the E-portfolio provides an online location to keep their records of achievement such as images, project reports, resume and graphic presentation. Most of them (23 respondents out of 27), especially the students, believed that the Electronic portfolio has an equal function to the traditional "file-based portfolio" where it served as the compilation of work items, while others felt that the E-portfolio plays an important role during the process of completing the work and assignment. For example the following statements were made by students:

> *"The function is to collect materials to develop reports for the assignment. I use the space given very well" (FB Comm, 2014, CS, Student15, Female)*

> *"I like it because I can put everything into it…for a creative person, he may insert video, audio and lots more" (FB Comm, 2013, KP, Student05, Male)*

On the other hand, one instructor mentioned that she uses her E-portfolio pages as teaching materials, showing them using an LCD projector during lectures. She prepared and created the materials beforehand and made sure that the pages were interesting by incorporating plenty of colours and images. However, although the students seemed happy to learn through this method, it was quite challenging for the instructor to develop pages for each module. She said *"If we were given ample time to create this, maybe we can focus and do it properly"*. A few instructors (2 out of 6) also agreed that the E-portfolio could be used as an online learning and assessment method where the students' work could be assessed

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online through their E-portfolio pages. However, a complete guideline on how the pages should look like must be provided so the assessment could be fairly evaluated. The students (13 out of 19) also mentioned that they had no problem using E-portfolios as part of the assessment method. However, until the instructor was fully trained in using the application, the traditional portfolio would be a better option. The students (17 out of 19) also stated that they did submit the work via their account and followed the manuals provided.

One interesting part is when the students (2 out of 5) from the Computer courses mention that they believe the E-portfolio to be a backup storage for their work, including assignments, project papers, quizzes and any learning materials. They elaborate further:

> *"I think this system is good as a backup storage in case our paper assignment gets lost somewhere from the portfolio file. Then, I can retrieve the files from this system" (Facebook Postings, 2013, CS, Student8, Male)*

> *"Because it often happened where a few assignments were lost from the file. If we save in the pen drive, there is possible for virus attack. So, using this system is mostly secure" (Facebook Postings, 2013, CS, Student10, Male)*

The respondents (25 out of 28 total respondents) confirmed that the E-portfolio has functioned as a place to store their collected work and achievements, as an assessment method, and also could be used as a backup storage method. Other than that, this application could be functioned as a social medium for users. Most users disclosed that they like to use the messaging function in the application to connect with friends and instructors. They described the system as seeming to be like Facebook, where they can see their friends' profiles, increase social connection and communicate via the online messaging system included in the E-portfolio application. They stated that:

> *"We feel excited at the beginning because the system's interface looks like Facebook" (FB Comm, 2014, FES, Student16, Female)*

> *"I like it best because the system does look like the other social networking sites, but more for educational purposes" (FB Comm, 2013, CS, Student01, Female)*

Theme 2 – E-portfolio Process leverage

The research was implemented with the mission to ensure the E-portfolio process that had been developed could have a positive impact on the learning and training process. The process, which adopted the theories from KEL and CBT, was created to match the learning process in the skills training programme. Therefore, these processes need to be evaluated so their influence can be reviewed in the future. The respondents had been asked the question "*In what ways could the E-portfolio process contribute to the implementation of the E-portfolio system in the learning and training environment?*" through e-mail and online messaging interviews. Five important aspects were derived from this theme which are the 'progress-based' instructional design, the group work impact, the instructor-led deployment, the peer mentoring, the reflection on the practical task, and the reflection through feedback and comments.

In CBT, progress-based learning is one of the key important features that provides a backbone for a vocational or skills training course. This is due to the requirement of the module content, where every activity needs to be mastered and tested. Furthermore, the majority of the trainees had low achievement in academic and formal education, and so this feature is suitable for them.

The E-portfolio process adopted the progress-based learning in a feature called 'PLAN'. This feature was incorporated into the application by MAHARA. The process of using it was developed and briefly explained in the guidelines for the students. There were exemplars provided on how to use the PLAN function during the system deployment. The objective of the function is to ensure the students know the activities involved in the module and what they need to achieve in certain activities.

Few of the respondents (13 out of 28 respondents) have agreed that the PLAN function has provided significant impact during the training session. They noticed that the function helps them to monitor the progress of their work. One student also said that, even though she had only used the PLAN function for one module, she

liked the checklist-alike feature in the application. She felt that it made her alert and organised when completing the assigned tasks. However, an instructor mentioned that, although they (the students) admitted the benefits of the features, half of the students did not follow the deadlines as stated in their PLAN. They submitted the final work by skipping the first and second reviews. Another instructor from courses that had few students said that the number of students in a class did contribute to the accomplishment of this process. He said that, in a class with fewer than 10 students, the instructor can keep on monitoring them to complete the work according to their PLAN. Otherwise, a student who always needs to be reminded will get lost and forgotten about. Some of the quotes that have significant ideas are as follows:

> *"I apply the PLAN function and put the date of submission so I will remember when I should submit the final report"- (FB Comm, 2013, KP, Student06, Female)*

> *"I can see the potential of the PLAN checklist to become a great way of monitoring the student's work. However, not all of them were aware of this function, even [though] they were being told many times" (Email, 2013, KP, Instructor02, Female)*

> *"The PLAN features in the E-portfolio pages have impacted on the students' progress of work. Some of them did submit according to the deadlines given, thus making good progress with the assignment. However, there are many students [who] still have no idea of how to use it and just submitted in one shot on the final submission" (Email, 2013, CS, Instructor01, Male)*

This PLAN function is the subsequent part of the practical reflection process, which is one of the E-portfolio processes that needs to be executed by the students. The students have to complete a practical task based on the questions published by the instructor. The practical training after lectures is compulsory for all skills training students. Through this hands-on training, they will apply the knowledge that has been learned in lectures. Therefore, as a pre-requisite of E-portfolio deployment, a student must undergo the practical training session and use the E-portfolio to reflect on what they have been taught during the session. This process also complies with the requirement of CBT features which need a trainee to reflect their knowledge of

the practical work. Most respondents (23 out of 28 respondents), especially students, agreed with this process activity and did mention about the reflection on learning. They stated that:

> *"After finishing the practical session, we have to produce a report explaining about the session and put it into the pages. Thus, I have to recall what has been learned and through that process, it makes me reflect on a few things that I shouldn't do and what are more suitable steps to do that task" (FB Comm,2013, KP, Student07, Female)*

> *"...for this purpose [the final project], we have to insert our progress based on topics completed. The final one after being reviewed by the instructor needs to be printed out. The project paper makes me reflect on what has been taught and what training I've done in that module" (FB Comm,2014, CS, Student15, Female)*

The other activity in the E-portfolio process is the group work task that had been assigned during the practical lesson. The E-portfolio deployment sheet suggests the use of the E-portfolio messaging system and "forum application" to be the medium of group discussion and communication. With the task instruction being delivered through the instructor's pages, the students must form a group and start to plan the assignment with the group members. The E-portfolio process is encouraging the group discussion via online communication so the meeting is not limited only to campus hours. Feedback related to group work stated that yes, the group was formed prior to the task's commencement. But, the discussion and communication happened only during class hours. Only three respondents (students) mentioned the use of online messaging to discuss their assignments. They said most of them like to meet face-to-face to discuss the work. The good side is the group task has improved students' efforts to accomplish the task given rather than doing it alone. One of the students stated that:

> *"We like the group task. All members did the assigned work even [though] it was not evenly distributed. But at least we don't do it alone. We share ideas and thought." (FB Comm, 2013, CS, Student01, Female)*

Consequently, the instructors (4 out of 6) provided positive feedback regarding the use of the forum application, with one stating that the feature makes information

dissemination easier. The instructors admitted that the collaborative learning through group work occurred through mediation by the E-portfolio application. The students had discussed and shared ideas through the forum. However, most of the instructors (5 out of 6) admitted that only a few students did message them using the messaging application to ask about the work. The rest of them preferred to meet in person during class hours.

The next essential process in the E-portfolio is the feedback strategy. This process should be carried out by the instructor with the motive to improve students' work, increase motivation and support reflection. The majority of the student respondents (17 out of 19) said they liked the feedback feature because they liked to know what others thought of their work. The feedback also leads to reflection on the students' work, which contributes to the improvement of their knowledge. Some of the interesting quotes are as follows:

> *"Mr H read my report and asked me to do the correction in a few parts. I amended it and placed it back on the E-portfolio" (FB Comm, 2013, CS, Student01, Female)*

> *"… Then the lecturer praised me a lot" (FB Comm, 2013, KP, Student06, Female)*

> *"I think by doing the correction and considering the suggestions of others, I can reflect on the learning and find new knowledge" (FB Comm, 2014, ELC, Student18, Male)*

The next feature in the E-portfolio process is the 'Instructor-led deployment' where the instructor takes full charge of the system deployment, starting from the module initiation until the end of the cycle. Communication with the students commenced when the tasks or the assessment questions needed to be uploaded. Then, the instructors monitored the progress of students' work by checking the submission of work progress in their respective pages. The instructors then have to review the progress and provide annotation so the students can reflect on their mistakes and improve for the next tasks. At the same time, the instructor should actively prompt questions and motivation in the online forum to increase students' motivation and desire to continue to use the system. However, based on communication with the respondents, it is clear that most of the instructors have not been actively involved

in the system, thus making the deployment process slow and delayed. The students stated that:

> *"The instructor made comments on my work. But, when I ask for help with a few problems, they seem [to have] no idea how to solve the issues and [this] makes the process delayed" (FB Comm, 2013, FES, Student04, Female)*

> *"Yes, my instructor did insert the questions in his pages. But, that's it. He then asked us to submit the PLAN. But, he didn't guide us how to do it" (FB Comm,2014, ELC, Student17, Male)*

The instructors (4 out of 6) admitted that most of them had very little knowledge about the system, but they tried very hard to practice and get used to the application as much as they could. They even mentioned that they referred to YouTube and read a few articles about the E-portfolio to strengthen their knowledge about this application in order to convey the information to the students. However, with the working time limitation and work burden from time to time, they always forgot to continue the job of checking the students' items on their pages. One stated that:

> *"I admit that I have tried so hard to understand and use the system. It looks like easy in the manual, but when it comes to practicality, it seems hard and challenging. I managed to create my own pages and publish the questions as requested. But, when it comes to checking the students' work, I know I will fail to do it. However, I still managed to give feedback on most of their work and help them based on my limited knowledge. This process should take longer time [for someone] who has a lower IT-operating capability... That's me, I think..." (Email, 2014, FES, Instructor04, Female)*

In 2014, the project added one extra process, which is peer-mentoring strategy. This is due to the lesson learned from 2013 reviews where most instructors confirmed that students were more comfortable to ask for help from their colleague either during class sessions or outside class hours. Therefore, the peer-mentoring technique was deployed where students who have more proficiency in computer and IT skills will help the other students who have difficulty in using the system. The 'mentor' was identified by the instructor based on their capability in operating the system and other computer applications such as Microsoft Word, PowerPoint,

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Internet Explorer, etc. The 'mentees' or students who needed assistance were chosen and assigned to their mentor by the instructor and the mentor her/himself. This is because some students have their own preference for one colleague over others. The peer-mentoring approach was initiated just after the instructor had published the assignment questions in her/his pages. The mentor was expected to assist their mentees based on the manual and with emphasis on the exemplars provided. For the computer course, this strategy seemed to work as one-third of the students were identified as 'mentors' by the instructor. However, in the plantation and dressmaker courses, it appears to be an issue as only one of the five students in dressmaking and one of the nine students in the plantation course had the ability to operate the computer and application very well. In the electrical course, two of the fifteen students had been identified as mentors in the class. The respondents were asked if the number of accomplished students has any connection with the number of mentors in a class, and they totally agreed. A few quotes that are significant to this situation are as follows:

> *"I prefer my friend to be my assistant because he always shows me how to do something in the system. However, not all people have ability to operate this system very well. So, I think only students who really have passion and are motivated will continue to use this system and consistently asked the mentor for help" – (FB Comm, 2014, ELC, Student18, Male)*

> *"The number of mentors is small. They have to assist many students at one time. Sometimes, they complained to me that a few of the students [are] still unable to do the simple tasks even [after] been taught so many times. It's all about willingness..." – (Email, 2014, LDG, Instructor07, Female)*

> *"I can see the positive side of the mentoring approach. Some of them have shown improvement by using the system for the practical work. But the mentors aren't always there to help them. The mentors also have their own work and responsibilities. The students still have to be independent and make an effort to explore the system by their own. The manual has detailed everything, they just need to follow the instruction. However, not all students are motivated. Some of them are good, but some of them are too many excuses..." (Email, 2014, CS, Instructor03, Female)*

To summarise, the E-portfolio process adaptation, such as the "progress-based" instructional design, the group work assignment, the practical task-based reflection, the

feedback approach, the instructor-led deployment and the peer mentoring seem have shown a positive impact with the use of the E-portfolio during the teaching and learning process.

Theme 3 – E-portfolio benefits

 After completing the E-portfolio blended learning, students and instructors had now experienced how the system works and what it can contribute to the teaching and learning session. Questions were then asked about the E-portfolio advantages and what contribution it has made. Most instructors and the principal mentioned that, with the E-portfolio usage, they can save costs in terms of paper and printing. Students uploaded their draft reports in their pages and only printed the reviewed and finalised one to be inserted in their file portfolio. An instructor and a student stated that:

> *"The printer cartridges seem to last longer now. The students also comment that they can save their money to print the assignment. Instead of printing repeatedly, they can now only print the verified version and put that into their file..." (Email, 2013, CS, Instructor02, male)*

> *"Last time, we had to print at the printing shop almost 2-3 times before submitting the final work. But now, we can just put the draft on the system and wait for the instructor to check and feedback. We printed the confirmed one and submit [it] for verification before putting it into our file..." (FB Comm, 2014, CS, Student15, Female)*

Then, the principal stated that, with the E-portfolio implementation, the institute might gain higher recognition from the public and industries. The institutes may be seen as a high technology college due to the adaptation of this system in the teaching and learning process. In addition, the recognition also could be obtained from the awarding body, the Department of Skills Development (DSD), Ministry of Human Resources. This is because every year the DSD conducts a performance evaluation of all skills training institutions for 'star rating'. The implementation of any kind of e-learning will show that the institution is making an effort to promote IT in teaching and learning. He said that he will mention the E-portfolio on the evaluation form and explain about the system when the verifier made a verification visit. For some reason, the instructors and students were not aware of the matter, but they strongly agreed to support the management during the verification session.

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Other benefits that have been derived from the interviews were that the E-portfolio has improved communication between students and peers as well as with their instructors. One student said that, by using the messaging system, she can message her instructor to ask questions and make requests. Another student said that he can chat with his friend using the messaging system and sometimes 'poke' his friend's wall. They could also discuss their group work through the messaging system. Students stated that:

> *"I like the messaging system that looks alike the Facebook chatting. However, we only use this during class hour, because everyone keeps logging on with the system. It is good so we don't have to meet personally with the instructor, especially when we have an urgent matter to resolve. They are always busy, though still have time to respond to our message..." (FB Comm, 2013, KP, Student06, Female)*

> *"Yes… we "use the chat system to discuss the group work… it's convenient if you want the rapid feedback" (FB Comm, 2014, CS, Student15, Female)*

> *"We can share the information in the system, each person can view on their own PC in the lab" (FB Comm,2014, LDG, Student19, male)*

> *"When I submit the work, the instructor shows fast action to give comment and feedback"- (FB Comm, 2013, KP, Student05, male)*

> *"I think it was useful for the member who cannot attend in group meeting"- (FB Comm,2013, KP, Student07,Female)*

> *"It's also useful for online submission to the lecturer... We don't have to meet her"- (FB Comm, 2014, ELC, Student17, male)*

The instructors (2 out of 6) admitted that sometimes students did message them to ask about assignment and tasks. They did reply if the issues were minor and unimportant. However, if the concerns needed to be solved by discussion with the respective student, they preferred to meet them in person.

The instructors were asked about the performance and learning improvement of their students after being exposed to the E-portfolio application. Some of them (3 out of 6) said that a few of their students has increased their motivation to accomplish the task due to the excitement of trying a new challenge. They keep vying for who uploaded the work first and felt proud if it was them. However, not all students have a positive attitude to wish to

experience new things. Some of them are still the same people, who need to be pushed to finish their work. To cater for this issue, the instructors put this kind of student in a group with constructive members.

Responses from one 2014 respondent said that students who had used the system with their mentors had improved their efforts to accomplish the assigned task. They also admitted that they had acquired new skills in IT and improved existing skill in using computer applications after being taught by the mentors. These consequences are a good sign of the potential of the E-portfolio to help them in constructing new knowledge and skills. A few quotes that are significant are as follows:

> "*I am now faster when searching [for] materials on the Internet. I also had improved on how to organise functions in Word processor*"- (FB Comm, 2014, LDG, Student19, Male)

> "*Now, we know how to do the steps like uploading, downloading, clicking functions, exploring the Internet and other computer skills*" (FB Comm, 2014, FES, Student16, Female)

> "*The students show some improvement in terms of using the computer and Internet application. This is good for them, especially students from this course that rarely use a computer during the training. This experience, hopefully, can help them when they graduate and begin to work in the industries soon...*" (Email,2013, LDG, Instructor07, Female)

In conclusion, the benefits that could be derived from the use of the E-portfolio are cost saving on printing and paper, a higher recognition for the institutions from awarding bodies, and an improvement in the students' communication with peers and instructors, which could motivate them to accomplish tasks, and the acquisition of new skills and knowledge in IT.

Theme 4 – Issues and challenges

Despite the benefits of the E-portfolio application, the implementation encountered a few issues and challenges that need to be considered in great detail in order to achieve efficient execution in the future. Issues were raised by the respondents in the communication during the system's implementation and were also obtained after the session ended. The issues

covered the user attitude, user proficiency skills in computer application and English language, the support from both instructors and management, the assistance from the system's support and the physical facilities required during the implementation.

The email and FB communication revealed that the user's attitude was the biggest challenge during the implementation. This was revealed by all 24 transcripts showing at least one sentence referring to the user attitude, behaviour, the passion of the user, and the willingness of participants including students and instructors to engage with the system. The majority of students mentioned that not all members in their group cooperated with putting items in their E-portfolio. Reasons such as workloads, time consuming, no idea how to operate the system and unable to find an available computer were given to the instructor. However, there were other students who did make an effort to use the system, even if they had to wait for a turn to use a computer in the resource centre, and who always sought help from their mentors or instructors. A few statements that have been expressed by the respondents are as follows:

> "There are student who are lazy and let us do the research... They just simply play with the Facebook "(FB Comm, 2013, KP, Student07, Female)

> "I rarely give my work to the boys because I know they will easily copy my work and do a bit of modification and then claim it as their work"- (FB Comm, 2013, CS, Student01, Female)

> "If she [lecturer] let us do it on our own like after class, at home or hostel, we really don't take it seriously..." (FB Comm, 2013, KP, Student05, Male)

> "Maybe because we are always busy with our work, so we don't have enough time to open a laptop and focus on this" (FB Comm, 2014, FES, Student16, Female)

> "It's not easy to attract students to use the system. Some of them did show an effort and give cooperation throughout the process. But, there were students who always give excuses and keep delaying to submit the work" (FB Comm, 2014, CS, Mentor01,Female)

> "The biggest challenge to encounter is the user's willingness to do this. Both instructor and students must possess a high perseverance and keep a good effort from the beginning until the end of the session. The students were from a low-achiever background, so we don't expect they can easily adapt to the system. They will... but it may take lots of time. We have to be patient and tolerant with this situation..."(Email,2014, Principal, male)

Some of the respondents (11 out of 28 total respondents) did relate this 'no effort' attitude to the user's proficiency in computer use. They said that the participants' courses have influenced their performance on the system. The instructors (4 out of 6) for non-computer courses also agreed that their students needed to refer to some of the mentors from the computer course when they had a problem while using the system. Thus, they said that, in order to ensure that the system will achieve maximum use, the user must possess at least basic computer skills on how to operate Windows, Internet and applications such as Microsoft Word, Excel and PowerPoint. Moreover, the instructors (3 out of 6) mentioned English proficiency as being one of the factors to ensure continuation with system use. Most of the students from a low-achieving academic background have poor understanding of the English instructions. Therefore, it is suggested that the system has bi-lingual instructions so the students would be able to choose the language they prefer.

The next issue and challenge is the instructors' support and the encouragement of the institution's management. The majority of students (14 out of 19) observed that their instructor was too busy and thus there was a lack of support. They said they felt confident when the instructor provided a guide and gave feedback when they finished a task and submitted it on their pages. This support encouraged them to engage with the system regularly. Otherwise, they felt that nobody cared and they gradually left the system. On the other side, the instructors (5 out of 6) admitted that the students did ask them and requested assistance during the implementation. However, due to their limited knowledge of the system, they also were unable to contribute much to help their students in certain issues. In these cases, they asked the students to contact and explain their problems to the system's admin through email. Apart from that, it was felt that the management of the institution should also take the implementation seriously and give full support and stimulate its use by promoting the system during the monthly assembly with the students and monthly meeting with the instructors. Further action, like forcing the students and instructors to use the system could also increase their degree usage. The instructors suggested the management should appoint one special dedicated officer to manage and maintain the system, so s/he will be available to offer assistance when needed.

Besides the support needed from the instructors and the management, assistance from the technical and system support is also vital to ensure the system's implementation succeeds. The training conducted by the system's developer or system administrator needs to be organised prior to the implementation. After the training or workshop has been delivered, the on-going assistance has to be maintained and a refresher session should be conducted after 3-4 months' execution in order to energise the users' motivation. However, due to a long-distance relationship between the system administrator and the users, the assistance and guidance are only possible through e-mail and online communication like instant messaging and online chatting. No face-to-face guidance can be organised, even though video conferencing had been tried before. Due to the bandwidth limitation of the Internet capacity on the campus, the video conferencing experienced lag and the communications were delayed and interrupted.

A few quotes related to the support required along the system's implementation are as follows:

> *"The management should appoint a dedicated person to manage and maintain the system. It will ease the users to refer when having difficulties with the system..." (Email ,2013, KP, Instructor02, Female)*

> *"The issue here is less encouragement from both instructors and the management to continue to use this. We are on our own. We just refer among us to do this..." (FB Comm,2014, ELC, Mentor02, male)*

> *"I think the implementation lacks supports from the management. They let us do at our own pace. They are supposed to frequently asked how it's going or give moral support to show they are concerned with the situation..." (Email, 2014, CS, Instructor03, Female)*

> *"Yeah…the instructor only reminds us about the work when the deadlines nearly there. So, we sometimes forgot and complacent due to the existing workload…"(FB Comm, 2014, CS, Student14, male)*

The final challenge is the lack of the physical facilities that should be provided by the institution in order to support the system implementation. The facilities that play a major part are the devices required by the system such as computer, scanner, digital camera/video and the peripherals like cables, mono-pod and others. However, the participants (23 out of 27 respondents) mentioned that the computers available for non-computer course students

were located in the resource centre, which was not sufficient to cater for many users at one time. The computer course students have their own lab, thus this is not a major problem for them. But for students on the non-computer courses like plantation, kitchen practice, dressmaking and electrical, they have to find an available computer to keep updating the system. Some of them admitted that they have their own laptop, yet the Internet is not capable of accommodating many users due to low bandwidth. The process of uploading and downloading materials seems to take a long time and is boring for the users, and thus they choose to leave the system unattended. Some of the quotes referring to this situation are as follows:

> *"The major problem here is the Internet capability... It was so slow and incapable to facilitate many users at one time" (FB Comm, 2014, CS, Student14, male)*

> *"The availability of the computers is one of the problem... the Internet also seems unstable"(FB Comm, 2013, KP, Student07, Female)*

> *"I have my own laptop, however, I need to use the Wi-Fi on campus as I don't have personal broadband service. But, it seems that the Wi-Fi is unstable and always hang when I tend to upload my work. It's really annoying and takes time. We have many things to do instead of waiting. So I'll just leave the work to be uploaded by itself. But, it doesn't work as expected. The uploading process was stuck and ended just like that..." (FB Comm,2014, ELC, Student18, male)*

> *"We are the dressmaker students. We don't have the Internet facilities in our place. We have to go to the main campus to use the Wi-Fi there. It's quite far to go there, so our instructor decides that we can go there once in a week, when we have to attend the co-curriculum activities. But, during that day, many students want to use the Wi-Fi and cause the line to become so slow. However, sometimes we manage to surf and save a few materials from the Internet..." (FB Comm, 2014, FES, Student16, Female)*

> *"Sometimes when I was teaching them how to do the Pages or the PLAN checklist, the Internet went down. We waited for almost 15-20 minutes to refresh the connection. It was so annoying and wasting time.." (FB Comm, 2014, ELC, Mentor02, male)*

Theme 5 – E-portfolio success factors

In the final semi-structured email interviews and Facebook communication, the respondents were asked with the question *"What are the success factors of E-portfolio implementation in the Skills Training's learning and training environment*. It is integral to

investigate the causes or reasons relating to how the system could be deployed efficiently in one organisation. So, the key points can be improved, adapted and absorbed for future implementation. The responses gathered related to this theme were quite similar to the responses in the Issues and Challenges theme. Based on the data, the factors can be divided into four: the function and process of the E-portfolio, the holistic institutional support, the facilities and requirements and, finally, the maintenance and technical provision.

The E-portfolio function and objectives are the primary cause that influenced the use of this application during learning. The reason why it is being implemented must be logical and clearly disseminated to all users. The functions such as being introduced as an online assessment, as a teaching tool or just for a personal showcase must be determined and explained. A few respondents stated that:

> *"Students and teachers or any management staff who are the user of the system must know why they have to do this. The objectives must be clear so they can prepare themselves to change. Change is not easy. It requires sacrifice of value matters such as time, effort and skills. So, to ask them to change, the system must provide the very reasonable objectives so we can get their attention and cooperation" (Email,2013, CS, Instructor01, male)*

> *"I've read a few websites related to the E-portfolio application. I can see it offers such a great function. I thought it just for online assessment like we had been using it. Never thought it can be one's personal showcase to keep records like a résumé or photo albums. So, I think for the next implementation, it is good to explain the functions this system could offer and how to use each function. Then, it depends on the user to choose whatever they like with their own E-portfolio" (FB Comm, 2014, CS, Student14, Male)*

> *"The mixture of E-portfolio purposes can lead to misperception and futile implementation" (Email, 2013, KP, Instructor02, Female)*

Besides the E-portfolio functions, the deployment process also plays an important role to ensure that the users understand how to operate the system and use it in line with the objectives that have been set. An explicit and easy process should be developed to encourage users to give a try-out as well as to motivate the user to continue using it until the end of the session. Both instructors (6 out of 6) and students(15 out of 19) agreed that the process of deployment needs to consider their level of computer skills and literacy. For users who have a non-IT background, they need a process that uses simple terms, an introduction that takes a few steps at a time and a clear objective for every step taken.

The second factor identified was the institutional support needed from the beginning of the implementation until it is successfully deployed and evaluated. In this factor, the four main supports were discovered that would have an impact on the effective execution. Firstly, the engagement of the instructor her/himself to promote, assist and be a positive role to be emulated by the students. The instructor needs to give their full commitment and actively invite students to be active users. An enthusiastic attitude will indirectly motivate the students to participate in the system. Apart from the instructor's role, the influence of peers could also increase the chances of engagement with the system. Respondents from the 2014 cohort mentioned that they felt comfortable to ask for help from their colleagues rather than referring to their instructor. The mentor-mentee approach through the peer-mentoring method seems to have contributed to a positive result in order to enhance students' motivation to continue using the system. However, competent instructors and mentors need to master the process and be trained to use the system very well. Thus, the training and workshop are very important to provide information and guidelines as well as to demonstrate hands-on practical activities on how to operate the system in the correct way. Finally, all the support systems mentioned above can only be achieved if the management provides full cooperation and approval. The management is suggested to enforce the use of the E-portfolio to all students, whatever their courses, so that it will be introduced fairly in the institution. However, the utmost significant action is to give support in terms of financial and moral support for this system's implementation. A few quotes from respondents who have significant ideas are as follows:

> *"They key to success is in the management's hand. If they take it seriously like enforcing the application to be used for all classes, maybe the percentage of active users will be increased. However, the introductory session like workshop and courses should be conducted prior to implementation in order to attract users and enhance the function of the application and how to operate it" (Email, 2014, ELC, Instructor06,male)*

> *"We need to be trained before using this system. The practical session would be a help..." (FB Comm,2014, LDG, Student19, Male)*

> *"The assistance from the instructors is very important to guide us throughout the process. However, sometimes the instructor seems not so sure about the functions included in the system and avoids giving the answer. Maybe because she didn't know the answers as well..." (FB Comm, 2014, FES, Student16, Female)*

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The third factor that could be a key to the success of the E-portfolio implementation is the provision of facilities and the system's requirement. It is essential to provide hardware such as computers and devices like digital cameras and scanners for the users. As the project requires the students to upload images or videos, devices to achieve this should be provided. However, most of them (13 out of 19 students) admitted that they used their own mobile phones with embedded camera and recorder functions. The crucial part is the computers and the Internet lines, which were very slow. The students (15 out of 19) said that not all of them have their own laptop or tablet. The computers provided in the resource centre seem to be insufficient to cater for many users at one time. The same applies to the Internet line, which is slow due to the heavy load of many users at a time. The dressmaking instructor stated that:

> *"To achieve maximum use of the system, the Internet line must be capable to accommodate many users at a time. The facilities like computer and scanner also should be added more in the resource centre. These requirements are crucial if the system wants to be implemented seriously in coming semester..." (FB Comm, 2014, FES, Instructor04, Female)*

The principal views that low-cost equipment, either hardware or software, is preferred by most of the private institutions as they are funded by their own revenue. The 'free-licence' software and low expenses for maintenance of hardware such as database and computers are advantages to ensure the system will continue to be executed in the institution.

The last key factor towards the successful implementation of the E-portfolio is the technical assistance from the system administrator or system's experts. This is different to the training or workshop needed, where the training may be conducted only once or twice. Providing the required assistance is vital along with the use of the system during the training semester. Continuous assistance should be provided maybe through an 'in-person' consultation or in a small group tutorial. The 'in-person' guidance is suggested for users who are having difficulties operating the computer's basic functions and the system as well. The system's expert is also requested to train the mentors in each group so every course or group will have their respective experts who will respond to issues promptly during the implementation. Besides the issues related to the application, the technical team also needs to deal with concerns related to operating the hardware and devices, such as how to perform

scanning, transferring files from devices to the computer, computer technical problems and any other issues linked to the E-portfolio application. A few statements related to this factor are as follows:

> *"Some students didn't know how to scan and move the file from the digital camera to their laptop. There is a need to provide assistance to cater for these problems otherwise the process of developing the Pages in the E-portfolio will be delayed" (FB Comm, 2014, ELC, Mentor02, Male)*

> *"The on-going guidance from the system administrator is essential to ensure the users don't lose the direction along the system's usage. We know that the researcher is monitoring from far and gives response through the email; however the face-to-face assistance is the more appropriate way to enhance motivation of the users" (FB Comm,2014, CS, Instructor03, Female)*

Apart from these key factors, one of the instructor also suggested to develop a usable and flexible framework or guidelines that mapped out the support needed by certain types of users. The users should be categorized by her/his proficiency in operating computers and application and the most important characteristic is the attitude and behaviour. Through this guideline, the deployment will be clearly driven to a much more promising outcome with back-up plan if something goes wrong. This recommendation has motivated me to come up with an innovation – a 'scaffolding technique' to be introduced to any MSTP institution that intends to deploy the E-portfolio in the future. This technique is described and explained in the Chapter 6; Research Findings and Discussion. Some of quotes referring to this suggestion are:

> *"I think there should be a proper guideline that illustrates the support and assistance that have to be provided or must be carried out by the user, in order to help them go through the system's implementation. Someone has to think about that for the future implementation.." (FB Comm, 2014, FES, Instructor04, Female)*

> *"The students and us have lack of experience on using the e-learning system or web application. Some of them [students] behave inappropriately and show no effort at all to try and learn. It would be better if we can outline a solution like personal tutoring, training, motivational course and personal supports to these kind of people" (FB Comm, 2014, LDG, Instructor07, Female)*

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5.11   Summary of Qualitative Findings

The qualitative findings, which were gained from interviews via email and Facebook messaging system as well as the Facebook postings, can be summarised into the five themes of the potential role of the E-portfolio, the effectiveness of the E-portfolio process, potential benefits of the E-portfolio, issues and challenges of the E-portfolio and, finally, the key factors of E-portfolio successful implementation in the MSTP.

The E-portfolio was identified as having the potential to be used for four purposes: a personal compilation, teaching and learning support tools, alternative storage, and a medium through which to communicate and socialise. The respondents, especially students, believed that the E-portfolio had become a representation of themselves during learning where the achievement records, résumé, reports and all related work and assignments can be compiled into one place. Some of them have described the system as an alternative storage method to their own USB drive. The students also used the system to socialise and communicate with peers and instructors, as the majority of the respondents equate the E-portfolio to social networking sites like Facebook. In addition, they commented on the potential of E-portfolio to become part of the assessment method. Similarly, the instructors also agreed that this system has potential to become part of their teaching and learning strategy. Apart from becoming the assessment medium, the E-portfolio was also used as a teaching material by one instructor during the lectures.

In this project, the main target for the use of the E-portfolio was to evaluate the deployment of the E-portfolio that had been developed by adopting the two learning theories that relate to the learning structures in the MSTP. CBT and KEL theories underpinned the process, thus ensuring that the E-portfolio was deployed according to the nature of the MSTP. The primacy of the MSTP learning structure, which is the progress-based learning that was adopted in the process, was believed to effectively play its role in supporting the students to work and submit their output. The process was also developed by following the existing assessment procedure, which is that hands-on or practical work must be conducted before

online submission. Then, the process of 'recall and report' after the practical work was done where at this stage, the student needs to develop documentation based on the practical training and insert it on to the E-portfolio. This stage seemed to be effective where the reflection occurred when people gave feedback and comments about their work. The collaborative learning through group-work activities also received a positive response. Most students believed that, through peer collaboration, the motivation for learning could be developed and maintained. Apart from that, the instructors' assistance through the 'Instructor led-deployment' activities was also considered to be vital due to their role as a main player in this system. However, the students' felt that the instructors lacked the relevant skills, thus slowing the process of adapting the system during the introductory phase. A new strategy of 'peer-mentoring' was deployed in the 2014 cohort, reflecting the findings of the 2013 result that students need more attention and close monitoring by their peers. This strategy was accepted and was believed able to maintain the students' fidelity to the system.

The next theme is the E-portfolio benefits, which can be divided into two parts: beneficial to the teaching and learning areas, and beneficial to the institution involved. It was believed that the E-portfolio could improve the communication between the students and instructors as well as with peers through the messaging system functions. In addition, the E-portfolio also increased the students' efforts and motivation to accomplish given tasks when performed with friends and mentors. The skill of operating a computer and the IT skills in general have also improved since the implementation of this system, especially for students with a low level of IT literacy. The E-portfolio also showed the potential to support a 'green environment', which meant less paper and printing. The respondents did mention that the E-portfolio has contributed to saving the cost of printing and the use of paper. The senior staff also mentioned that, by implementing this system, the institution could improve its image to the public as a 'high-tech' centre, and thus qualify to earn more 'stars' in the rating procedures conducted by the Department of Skills Development (DSD), which is the awarding body of the MSTP.

The E-portfolio issues and challenges were mostly discussed and raised the respondents' interest during the data collection session due to the real situation that had happened throughout the implementation. The primary issues mentioned were the user attitudes and behaviour towards the use of this system. Some of the users chose to leave in the middle of the process, showed signs of personal inhibition, and refused to participate in the community of use. The instructors believed that this is because of those students' lack of IT proficiency and personal attitudes. The role of instructor has also been raised, as most of them did not demonstrate any competence in operating the system. The lack of support from the management, administrators and system developer was also expressed as one of the reasons why the E-portfolio implementation could fail. The insufficient number of computers also impacted the users from courses other than CS due to the limited number of computers provided on the campus. Furthermore, most of the students mentioned that the Internet facilities were unstable and not capable of catering for a great deal of users at one time. Thus, the lagging and waiting during the session made them despair and gradually leave the system.

The final theme, which is the E-portfolio success factors, has been described as being the 'catalyst' to increase the chances of this system being used in future implementation. The first factor is that appropriate E-portfolio functions and processes need to be designed so that the E-portfolio will meet the requirements of the users and program structures. The institution's support, which comprises the instructor engagement, enforcement from the management, the peer mentoring and sufficient training and workshops, must be planned and set up before and along with the use of the system. Then, the facilities and tools required by the system need to be cost efficient in terms of the software and hardware involved. A dependable Internet line is also one of the major keys to the success of the implementation due to the nature of 'on-line' application requirements.

Other than the themes mentioned above, the data analysis also yielded several useful pieces of information that might help to develop a better implementation in the future. Contradicting the finding of the quantitative analysis that there was no significant difference in E-portfolio use among the courses, the interviews revealed that there were dissimilarities of use between users of various courses. The instructors did mention that

students on CS courses quickly adapted to the system due to their frequent use and practice compared with students on the other courses. They said that, the more IT-literate a student was, the easier it was for them to adapt to the system. They suggested that several mentors should be assigned in one class so more assistance could be provided. The instructors also recommended a guideline or framework of support to be developed which focused on certain types of users. This framework should be tried out in the coming implementation to see its effectiveness and, from time to time, modifications can be made to the framework until it achieves a mature level of usefulness.

5.12   Conclusion of the Chapter

This chapter explained about the research activities undertaken during the E-portfolio project duration. The project implementation comprised an earlier study and the two year cohorts involved in E-portfolio execution. As this project involved reflection on the previous cycle of implementation, the lessons learned from each activity was taken into consideration to plan the next activities. For each phase of the activities undertaken, the summary of observations, reflections and summary of findings was elaborated. The data collection process was conducted at the end of the E-portfolio session, which involved the evaluation of the assessment rubrics, the survey questionnaires, the e-mail interviews, the Facebook communication and the Facebook postings. From the total of 94 students and 9 instructors involved at the beginning of the project, only 58%-69% of the students in both cohorts successfully finished and completed the task. Even though the numbers were quite frustrating, this research still has the potential to be deployed in the Skills Training Institution as the percentage of completed participants was above half. The online questionnaire was successfully completed by all the 27 students in the 2013 cohort and by 32 students in the 2014 cohort. Even though the process of completing the questionnaire took longer than expected, I was grateful that the participants showed commitment and were willing to cooperate. This same situation applies to the evaluation rubrics where all 177 rubrics were filled in by the instructors for pre and post E-portfolio deployment of 59 students. A total of 27 people were interviewed via email and online communication in the two and a half year term, producing a total of 24 transcripts. The outcomes from both

quantitative and qualitative methods have been detailed separately. The findings have inspired me to develop new technique to support a promising use of the E-portfolio in the MSTP in future implementation. The analysis and further discussion of the research findings are further provided in the next chapter; Chapter 6 Research Discussion.

CHAPTER 6

RESEARCH DISCUSSION

6.1   Introduction

In the previous chapter, the results of all activities based on every step of the research process were presented in chronological order. Therefore, in this chapter, I am deriving the outcomes from the analysis to be listed and combined, thus producing meaningful findings. Prior to that, the analysis of participants is explained to see how many of them have contributed to this research overall.

The findings of this study begin with the summary of results gained from the analysis in the previous chapter to see the results in a broader picture. Then, also from the analysis, the outcome statements are derived, listed and categorised by themes and data collection methods. These outcomes are then amalgamated to produce short, compact and precise statements representing the outcomes in a theme. However, for findings that were inconsistent between the two methods, further discussion are elaborated. Eventually, the new statements are then claimed as research findings and are discussed to see their connection with the previous literature.

The chapter continues with the presentation of findings conducted using the 'report and respond' inquiry process (Sarantakos, 1994; Sitko, 2013; Stronach & MacLure, 1997), as

has been described earlier in Chapter 4. Then, the validation continues where the E-portfolio features in this research are checked and matched with the E-portfolio indicators that have been produced in the latest research of a higher academic institution in Malaysia. Next, to ensure that this research has answered all the research objectives that have been set earlier, the evidence checklists are also discussed. Before the end, this chapter will also present the innovation made based upon the findings of this research. It was inspired by the feedback of the participants as well as motivated by the previous studies.

6.2   Analysis of Participants

This project took one training semester in each year, 2013 and 2014, where engagement took place for approximately 6-7 months over each semester. In 2013, a total of 39 students from three courses had been registered initially at the project's commencement. However, at the end of the session, only 27 students (69%) had successfully completed the task assigned to the project. The other 31% were reported to have left during the session, and chose to submit their work manually to the instructor at the end of the module session. Meanwhile, in 2014, of 55 students registered, 32 students (58%) managed to remain until the end of the session. **Table 6.1** illustrates the details of the participants involved in this project.

From table (6.1), it can be seen why the 2014 cohort had a lower percentage of student completion. It was due to the lower completion rates of Plantation and Electrician courses, where not even half of each class completed. Based on the responses from the respective instructors, these two courses need to spend more time in the workshop and on-site (palm-oil plantation), and thus only competent and IT-literate students chose to engage with the system towards the end. Even for the tasks that were meant to be completed in a group, there were groups where a few members opted to make a manual (paper-based) submission. However, despite these students' lower rate of completed participation, I feel grateful for the students' efforts to engage with this project, especially as some of them previously had low academic achievement. I hope that, for future deployment, I can gain more

involvement from both students and instructors in order to harness the benefits of E-portfolio in the MSTP.

Table 6.1 The summary of participants in the E-portfolio implementation project

Year of Cohort	Group	No. Of Participants (Registered)	No. Of Participants Completed	Percentage (%)
2013	Computer System L3 (CS L3)	12	9	75
	Kitchen Practise L4 (KP L4)	19	13	68
	Women's Dressmaking L3 (FES L3)	8	5	63
	TOTAL COHORT 2013	39	27	69
2014	Computer System L4 (CS L4)	26	18	69
	Women's Dressmaking L3 (FES L3)	5	4	80
	Plantation L3 (LDG L3)	9	4	44
	Electrician L3 (ELC L3)	15	6	40
	TOTAL COHORT 2014	55	32	58
	TOTAL STUDENTS INVOLVED	94	59	63

6.3   The Summary of Quantitative and Qualitative Outcomes

To combine the findings from both methods, I derived several outcome statements from the findings. **Table 6.2** lists the outcome statements accumulated from both quantitative and qualitative methods, which were put into themes and marked according to the method. The source of each statement were also stated in the Data Collection Methods column. The derivation of these statements were based on the objectives need to be achieved such as to explor the effectiveness of E-portfolio process used, the potential purpose of E-portfolio, the factors that could help to success the E-portfolio implementation and the issues around the execution.

Table 6.2 Lists of statements of outcome accumulated from both quantitative and qualitative methods

Outcome Statement	Theme/ Category	Data Collection Methods	
		Quantitative	Qualitative
1. The E-portfolio process does support the CBT concept of objective and hierarchical-based instruction	Process	√ 5.8.3, p211-213	
2. The E-portfolio process does support the progress-based learning	Process, benefit	√ 5.7.1, p199 5.8.3 ,p214	√ 5.10.2, p245
3. The E-portfolio process does support the learning reflection	Process, benefit	√ 5.8.3, p217	√ 5.10.2, p247
4. The E-portfolio process does support the knowledge construction	Process, benefit	√ 5.7.1, p199 5.8.3, p218	√ 5.10.2, p253
5. The E-portfolio process does support the social communication	Process, benefit	√ 5.7.1, p199	√ 5.10.2, p253
6. The E-portfolio process could increase the learning motivation through the collaborative learning, group-work task and the individual assigned task	Process, benefit	√ 5.8.3, p222	√ 5.10.2, p253
7. The E-portfolio process could increase the learning responsibility	Process, benefit	√ 5.8.3, p216	
8. There were no significant differences between courses for each of the variables in 2013 and 2014, which means that, no matter what course students are on, the nature of the courses will not affect the use of E-portfolio during training	-	√ 5.8.3, p211-231	
9. The assistance from the instructor was scored as neutral (3.0), which indicates that it is not achieving the target	Issue, Success Factor	√ 5.8.3, p231	
10. Most of them (both instructors and students) agree to continue the use of-portfolio in the Skills Training Program	-	√ 5.8.3, p226	√
11. E-portfolio could be used as a personal compilation/ showcase	Purpose		√ 5.10.2, p243

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Outcome Statement	Theme/ Category	Data Collection Methods	
		Quantitative	Qualitative
12. E-portfolio could be used as an assessment method	Purpose		√ 5.10.2, p244
13. E-portfolio could be used as supporting material in teaching and learning sessions	Purpose		√ 5.10.2, p243
14. E-portfolio could be used as an alternate storage method	Purpose, benefit		√ 5.10.2, p244
15. E-portfolio could be used as a medium for students to socialise and communicate with peers and the instructor	Purpose, benefit	√ 5.8.3, p223	√ 5.10.2, p244
16. The progress-based instructional design in the E-portfolio process has worked	Process		√ 5.10.2, p245
17. The group work/collaborative task assigned in the E-portfolio process could enhance students' motivation to develop the assignment	Process, benefit	√ 5.8.3, p222	√ 5.10.2, p250
18. The practical (hands-on) training as a prerequisite before developing the E-portfolio artefact could help to develop the students' process of reflection	Process, benefit	√ 5.8.3, p218	√ 5.10.2, p245
19. The feedback features also contribute to generating reflection for the students	Process, benefit	√ 5.8.3, p218	√ 5.10.2, p247
20. The instructor-led deployment in the early cohort seems slightly unsuccessful due to instructors lacking competency in operating the system	Issue	√ 5.8.3, p231	√ 5.10.2, p248
21. The peer-mentoring in the later cohort seemed to work to improve motivation and confidence to use the system	Success factor, benefit		√ 5.8.3, p219 5.10.2, p250
22. The students were prefer to use this system with their colleagues while on campus rather than independently at home or in their hostel	Success factor	√ 5.8.3, p226	
23. E-portfolio is believed to save the cost of printing and paper	Benefit		√ 5.10.2, p251

Outcome Statement	Theme/ Category	Data Collection Methods	
		Quantitative	Qualitative
24. E-portfolio could also improve the institution's brand name by getting higher recognition from the awarding bodies, thus increasing its image to the public	Benefit		**√** **5.10.2, p252**
25. E-portfolio could improve students' communication with instructor and peers	Benefit	**√** **5.8.3, p 223,225**	**√** **5.10.2, p253**
26. E-portfolio could enhance the students' efforts to accomplish the assigned tasks	Benefit	**√** **5.8.3, p216**	**√** **5.10.2, p253**
27. By operating the E-portfolio, the students and teachers could acquire new knowledge and skills relating to computer application and Internet technology	Benefit	**√** **5.8.3, p220**	**√** **5.10.2, p253**
28. The E-portfolio biggest issues and challenges relate to the attitudes of users who are unwilling to accept new opportunities	Issue		**√** **5.10.2, p254**
29. The users' proficiency in computers and IT also contributes to the difficulties in deploying the system	Issue, success factor		**√** **5.10.2, p255**
30. Instructors who are lacking in competence to operate the system have influenced the motivation of the students to continue engaging with the application	Issue, success factor	**√** **5.8.3, p231**	**√** **5.10.2, p256**
31. The institution's management provides less support for the implementation due to lack of exposure to the system's significance to the learning process	Issue		**√** **5.10.2, p256**
32. The system's administrator is remote and thus not able to provide face-to-face explanation to the users	Issue	**√** **5.8.3, p230**	**√** **5.10.2, p256**
33. There is a lack of technical assistance to overcome issues such as software and hardware failure	Issue		**√** **5.10.2, p256**
34. The Internet lines were unstable and unable to cater for many users at one time	Issue		**√** **5.10.2, p257**

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Outcome Statement	Theme/ Category	Data Collection Methods	
		Quantitative	Qualitative
35. The limited availability of computers on the campus meant not many users could be accommodated	Issue		√ **5.10.2, p257**
36. The E-portfolios that has effective process could potentially become part of the learning tools in the programme	Success factor		√ **5.10.2, p258**
37. The purpose of the E-portfolio application must also be explicitly comprehended by the user	Success factor		√ **5.10.2, p258**
38. The instructor must engage with the student to provide support and assistance	Success factor	√ **5.8.3, p230**	√ **5.10.2, p259**
39. Peer mentoring is also essential to encourage students to keep engaging with the system	Success factor		√ **5.8.3, p219 5.10.2, p250, p259**
40. The system administrator and management should organise a workshop and training prior to implementation	Success factor		√ **5.10.2, p260**
41. The encouragement from the management is necessary to emphasise the importance of the system to the users	Success factor		√ **5.10.2, p260**
42. The enforcement of this system for all courses should be taken into consideration if a dismissive attitude still exists	Success factor		√ **5.10.2, p260**
43. The institution should provide adequate software and hardware requirements to ensure the system's continuance	Success factor		√ **5.10.2, p260**
44. The "free-licence" or open-source software is preferable to reduce the cost incurred in an institution	Success factor		√ **5.10.2, p261**

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Outcome Statement	Theme/ Category	Data Collection Methods	
		Quantitative	Qualitative
45. The Internet capability should be improved so the processes during online deployment will be smoothly executed	Success factor		**√ 5.10.2, p261**
46. Proper guidelines should be developed to outline the support needed for different kinds of user on the MSTP	Success factor		**√ 5.10.2, p262**
47. Number of mentors did influence the motivation of the students to use the system. Having a higher number of mentors could increase the chance of having a higher rate of users.	Success factor		**√ 5.10.2, p250, p259**

6.4 The amalgamation of quantitative and qualitative outcomes

The outcome statements that were derived from both quantitative and qualitative analysis were then combined and gathered based on the themes. Those outcomes contained repetition, thus through this combination and categorisation, the statements that have similar meanings and repetition were accumulated into a group. Each group represents a theme. The five themes, which are Purpose, Process, Benefits, Issues, and Success Factors, were related to the research objective that aimed to investigate the E-portfolio usage experience in the MSTP. In each theme, several statement outcomes were developed by summarising all statements in the group.

Table 6.3 shows the summary of the final outcomes resulting from the amalgamation of those quantitative and qualitative findings. In this table, the first column shows the outcome statements that have been arranged and re-organized to be accumulated in the appropriate category. The second column, 'Themes', indicates the theme of each respective group. The last column is the important part where it lists the findings derived from the summary of the outcome statements in the first column. These findings become the main research discoveries that are discussed further in a later section.

On the other hand, there were findings that were inconsistent between data gathered through questionnaires with the data obtained from the interviews. This circumstances are discuss in 6.5 under the subtopic of Research findings and discussion.

Table 6.3 Summary of statements of outcomes (amalgamated and themed)

Outcome Statements	Themes	Summary of Outcomes by Themes
1. E-portfolio could be used as a personal compilation/ showcase 2. E-portfolio could be used as an assessment method 3. E-portfolio could be used as a supporting material in teaching and learning sessions 4. E-portfolio could be used as an alternate storage method 5. E-portfolio could be used as a medium to socialise and communicate with peers and the instructor	Purpose	**The potential of the E-portfolio proposition:** 1. An E-portfolio as a personal showcase collection 2. An E-portfolio as a supporting material for teaching and learning 3. An E-portfolio as online assessment method Statements 4 and 5 are included under the 'Benefit' theme
Outcome Statements	**Themes**	**Summary of Outcomes by Themes**
1. The E-portfolio process does support the CBT concept of objective and hierarchical-based instruction 2. The E-portfolio process does support the progress-based learning 3. The E-portfolio process does support the learning reflection 4. The E-portfolio process does support the knowledge construction 5. The E-portfolio process does support the social communication 6. The E-portfolio process could increase the learning motivation through the collaborative learning, group-work task and the individual assigned task 7. The E-portfolio process could increase the learning responsibility 8. E-portfolio could be used as an alternate storage method	Process and Benefit	**The E-portfolio implementation through its processes could benefit the teaching and learning in the aspects of:** 1. E-portfolio could improve communication and social relations 2. E-portfolio could support knowledge and skills construction 3. E-portfolio could enhance motivation and responsibility to accomplish tasks 4. E-portfolio could support the reflection of knowledge and skills throughout the module

Outcome Statements	Themes	Summary of Outcomes by Themes
9. E-portfolio could be used as a medium for students to socialise and communicate with peers and the instructor		5. E-portfolio may support progress-based learning, but the instructions must be clearly defined
10. The progress-based instructional design in the E-portfolio process has worked		6. E-portfolio may have the potential to benefit the institution in terms of cost saving and enhancing its image to the public, awarding body and industries.
11. The group work/collaborative task assigned in the E-portfolio process could enhance student's motivation to develop the assignment		
12. The practical (hands-on) training as a prerequisite before developing an E-portfolio artefact could help to develop the students' process of reflection		
13. The feedback features also contribute to generating reflection for the student		
14. The peer-mentoring in the later cohort seems to work to improve motivation and confidence to use the system		
15. E-portfolio is believed to save the cost of printing and paper		
16. E-portfolio could also improve the institution's brand name by getting higher recognition from the awarding bodies, thus increasing its image to the public		
17. E-portfolio could improve communication with instructor and peers		
18. E-portfolio could enhance the students' efforts to accomplish the assigned tasks.		
19. By operating the E-portfolio, the students and teachers could acquire new knowledge and computer application and Internet technology skills.		
Outcome Statements	**Themes**	**Summary of Outcomes by Themes**
1. There were no significant differences between courses for each of the variables in 2013 and 2014, which means that, no matter what course they are on, the nature of the courses will not affect the use of the E-portfolio during training		

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2. The students were prefer to use this system with their colleagues while on campus rather than independently at home or in their hostel		**The issues were identified as follows:**
3. The assistance from the instructor was scored as neutral (3.0), which indicates that it is not achieving the target		1. Personal attitude and behaviour
4. Most of them(both instructors and students) agree to continue the use of-portfolio in the Skills Training Program		2. Lack of user's IT proficiency (both student and instructor)
5. The instructor-led deployment in the early cohort seems slightly unsuccessful due to instructors lacking competency in operating the system	Issues and Success Factor	3. Not enough training and support from the management, instructor and system's administrator
6. The peer-mentoring in the later cohort seemed to work to improve motivation and confidence to use the system		4. Insufficient facilities such as computers and Internet
7. The E-portfolio biggest issues and challenges relate to the attitudes of users who are unwilling to accept new opportunities		**The factors that could contribute to the E-portfolio's successful implementation were identified as follows:**
8. The users' proficiency in computers and IT also contributes to the difficulties in deploying the system		
9. Instructors who are lacking in competence to operate the system have influenced the motivation of the students to continue engaging with the application		1. The objectives and the processes of an E-portfolio must be clear and understandable
10. The institution management provides less support for the implementation due to lack of exposure to the system's significance to the learning process.		2. Holistic assistance and support of all parties
11. The administrator of the system is remote and was unable to provide face-to-face explanation to the users		3. Training and workshops to enhance understanding and boost user's motivation
12. The lack of technical assistance to overcome issues such as software and hardware failure		4. The fundamental infrastructure is important to maintain the survival of the system
13. The Internet lines were unstable and unable to cater for many users at one time		5. Software, tools and guide materials must be sufficiently provided and taught
14. The limited availability of computers on the campus meant not many users could be accommodated		
15. The E-portfolios that has effective process could potentially become part of the learning tools in the programme		

16. The purpose of the E-portfolio application must also be explicitly comprehended by the user		6. A cost-efficient expenditure throughout the implementation and maintenance
17. The instructor must engage with the student to provide support and assistance		7. A support program must be planned as a guideline throughout the implementation process.
18. Peer mentoring is also essential to influence students to keep engaging with the system		
19. The system administrator and management should organise a workshop and training prior to implementation		
20. The encouragement from the management is necessary to emphasise the importance of the system to the users		
21. The enforcement of this system for all courses should be taken into consideration if a dismissive attitude still exists.		
22. The institution should provide adequate software and hardware to ensure the system's continuance		
23. The "free-licence" or open-source software is preferable to reduce the cost incurred in an institution		
24. The Internet capability should be improved so the processes during online deployment will be smoothly executed		
25. Proper guidelines should be developed to outline the support needed for different kinds of user on the MSTP		
26. Number of mentors did influence the motivation of the students to use the system. Having a higher number of mentors could increase the chance of having a higher rate of users.		

6.5   Research Findings and Discussion

In this part, I am discussing the findings derived from the summary of the outcomes with the literature to see their connection and relation. Prior to that, the findings on both methods that inconsistent were also discussed to see the relevance. The following discussion considers the findings from this study in the light of previous research reviewed in Chapter 2. The key themes that have significant impact for this study are the potential purpose of the E-portfolio, its benefits and the key factors towards the successful implementation of the system. The issues and challenges are not discussed individually because the statements in this theme will be covered in relation to the success factors, as both of these themes are related to each other.

6.5.1   The discrepancies of findings in quantitative and qualitative methods

There were a few discrepancies which occurred between the findings gathered from the quantitative and qualitative methods. The first one was related to the IT proficiency impact towards the use of the system. From the survey questionnaires, it was shown that there were no significant differences between courses for each of the variables in 2013 and 2014, which means that, no matter what course students were on, the nature of the courses did not affect the use of the E-portfolio during training. Either the student had basic computer skills (which the majority from the computer course students did have) or they did not.. This is supported by the number of accomplished Computer students in 2014 that scored lower than students in the Dressmaking course. However, based on the interview with students and instructors, most of them (19 out of 28) mentioned that they believed the students from the computer course had more capability to operate the system rather than other courses such as Dressmaker, Plantation, Electrician and Kitchen Practice. They also strongly believed that the user's proficiency in computers and IT would contribute to their abilities in deploying the system. By looking at this point, it can be suggested that, no matter which course the student followed, the basic skills of computer use is important to

assist them in using the system effectively. This basic skill is not only recognized for the computer course students, but also to the rest of the courses.

The second finding was related to the peer-mentoring strategy which verbally was claimed to have improved users' motivation to continue using the system during training. However, the percentage of completion in 2014 which is the year that the strategy was introduced was actually lower than for the 2013 cohort. From observation, in the 2014 cohort there were two courses that used the system for the first time (Plantation and Electrical courses). I could not compare the completion rate for these courses with the 2013 cohorts. For these courses, the verbal statement of the students and instructors became my evidence to suggest that the peer-mentoring strategy had improved certain students. For the Dressmaker course, the completion rate showed a 17% increase from 2013 to 2014 cohorts (63% in 2013 and 80% in 2014). This situation was confirmed by the instructor of the Dressmaker course who said that with help and encouragement of their friends, the students showed commitment to pursue the use during class time. For Computer courses, the completion rate decreased from 75% in 2013 to 69% in 2014. From the observation, this situation happened due to the commitment of Level 4 (2014 cohort) which is a Diploma level student, who went on Industrial training for final project accomplishment. The students who did not complete the system were from groups that were unable to come back to campus on time. They deferred the final project submission due to incomplete tasks. However, the peer-mentoring in this course was group based. Each group had their own mentor. Thus, the successfully completed groups mentioned that their mentors did a good job in coaching and assisting them to submit the work online. Based on this verbal evidence, I suggest that the peer-mentoring had significantly improved motivation of the users.

Finally, from the survey questionnaire and assessment rubrics, it was shown that the E-portfolio could support the progress-based learning of the students. However, through the verbal interview, some of the instructors and students did confirm that they were not using the PLAN function which was intentionally created to support this criteria. The PLAN function was defined to be medium as a checklist to the students so they could refer to it

as a reminder to submit work in progress until the submission of the final version. However, only a few of the participants used that function as a reminder. The rest of those who completed did submit the progress of work without using the PLAN function. They updated the submission to the instructor online after get notification through the forum, and a personal reminder came from their instructor through the messaging system as well as a notification on the group's page. So, basically the PLAN function was not fully utilised. However, the progress –based learning criteria were accomplished due to the efforts of the instructor and mentors to remind them in group's pages. Thus, I suggest that the E-portfolio did support the progress based learning yet the PLAN function needs to be refurbished and improved to attract its usage for future implementation.

6.5.2 Finding 1 - The potential of the E-portfolio proposition in the MSTP

From the emerging findings based on both quantitative and qualitative methods, three propositions for E-portfolio implementation were identified, which are the E-portfolio as a personal showcase collection, E-portfolio as a supporting material during teaching and learning sessions, and E-portfolio as an online assessment in the MSTP.

It was believed that the E-portfolio could be a **medium to collect personal artefacts** for students' own use. The participants in the MSTP mentioned inserting their best achievement and work outcome in the forms of documents, spreadsheets, images, audio, videos and graphic presentation. This finding shows similarities with several previous studies where an E-portfolio was seen as a representative of its owner that kept and showed his/her personal and professional development such as resume, personal achievements, blogs and journals (Barrett, 2005; Gerbic et al., 2009; Kocoglu, 2008; Krämer & Seeber, 2009; Nasab et al., 2010). In terms of the diversity of formats kept in it, Lorenzo and Ittelson (2005) and Barrett (2005) have described the E-portfolio as a container that may consist of elements of text, graphics, or multimedia with the accessibility of a website or other electronic media. This is supported by JISC where they define an E-portfolio as a product used to collect digital artefacts for articulating experiences, achievements and learning (JISC, 2008).

The E-portfolio has also been used as a **supporting material for teaching and learning** by one of the instructors in the MSTP. She believed that, by using this application, she could organise the images with the correct captions, write the explanation in the form of text, and provide links to several resources related to the topic, all in one 'Page'. However, this presentation must be prepared earlier and must be reviewed a few times to prevent missing any information that needs to be conveyed. Recent research by Mohd Bekri et al., (2013) also found that E-portfolio is an instructional product that has the potential to become an assistant to the teacher in organising the teaching materials. Their findings (Mohd Bekri et al., 2013), from gathering TVET teachers' views regarding whether to use the E-portfolio during lessons, revealed that most of them chose to join the community of use and try out this application. This indicates that the E-portfolio could be introduced as a supporting material in the MSTP specifically and TVET generally.

The E-portfolio was also executed to be **part of the assessment** in the MSTP. The blended assessment method, which consists of an online report submission and on-site practical assessment, has been accepted by half of the overall registered participants. Even though half of them chose to submit using a manual (paper-based) system, this application is still considered successful as it persuaded 58-69% of all registered users to use it. This result was acceptable since the majority of the users were low achievers in terms of academic performance. According to Jwaifell (2013) and Peacock et al., (2010), the E-portfolio could serve as a means of authentic assessment to demonstrate users' proficiency as well as to measure and record non-formal learning. In the research into developing an experiential learning E-portfolio, the result has shown that this implementation does support the assessment of professional/workplace learning (J. O. Brown, 2011).

6.5.3 Finding 2 - The potential benefits of E-portfolio implementation in the MSTP

From the findings, it was stated that the E-portfolio implementation has contributed to improve or enhance certain aspects of the learning process. The aspects of social

communication, learner's motivation and responsibilities, knowledge and skills development, reflection on learning and the progress-based learning concept are vital in MSTP pedagogy. In addition, the E-portfolio also has the potential to enable the institution to increase its image to the public, industries and awarding body. Each statement is discussed with supporting literature from previous studies.

Communication and social relations are one of the important features of the KEL and CBT theories that have been adopted in the E-portfolio process of deployment. Users were encouraged to communicate through the messaging function embedded in the system as well as to join in the Forum provided. As a result, it was found that the **E-portfolio could improve students' communication and social relations**. Both methods have proved that, via this system, communication was better established between learner and peers as well as with the instructor. From my observation, due to most of the students claiming that this system functioned like a social networking site (e.g. Facebook), it is clear that they prefer to make use of the messaging features to communicate with others. The interesting part came when some of them claimed that, by using this application, they did not need to organise frequent meetings among group members to discuss the project. They were able to keep updated with peers and instructors through this application, as well as taking part in the Forum application to share ideas and thoughts. This was also found by Nor, Raja, and Jhee (2012) and Mohd Bekri et al. (2013) where they discovered that, through E-portfolios, students are able to share developing ideas and receive prompt feedback through the dialogic functions commonly found in an E-portfolio. The established interaction could also improve the understanding of the learning and maintain good relations among learners and colleagues as suggested by several researchers in higher and further education on E-portfolio use during learning (Connolly et al., 2010; Farhang Jaryani et al., 2011; JISC, 2008; Norazman & Rahman, 2013)

The progress-based learning is one of the main concepts in CBT (McCowan, 1998) and MSTP pedagogy where it emphasises that the work achievement of learners should be attained in stages. By learning in chunks, the vocational student is encouraged to learn at a slow pace to ensure that they comprehend every step of the task (Galatis et al., 2009). The

E-portfolio process through the PLAN function illustrates this concept where the instructor plays a vital role in instructing the students to create the checklist (PLAN) containing the progress submission date and they should adhere to the plan created. Results showed that the **E-portfolio may support the concept of progress-based learning**; however, the instructions must be clearly defined, disseminated and conformed to. The concept of progress-based learning in E-portfolio use was supported by Buzzetto-more and Alade (2008) where they found that the E-portfolio process allows for the scheduling of periodic progress reviews. Therefore, it can be used to consult learners if any issues are identified along the progress. Holton (2006) also agreed that E-learning applications such as the E-portfolio could assist in supervising students' participation and progress. Paul Manning from Thanet College stated in the report on E-portfolio Implementation for the Joint Information System Committee (JISC) project: *"My NVQ students use their phones to capture evidence of what they have done and then upload it into their e-portfolios. This has really helped the progression among lower achieving students."* (JISC, 2012, p.4).

The E-portfolio process has also contributed to supporting the construction of knowledge and skills in several aspects, such as improving participant's computer and Internet operating skills, report organisation and the use of applications such as Microsoft Office, Paint and E-mail. As the tasks assigned required the students to explore the use of the Internet and insert pictures from the Internet or taken by camera into the report, it has indirectly encouraged them to learn, thus stimulating the construction and development of new knowledge and skills. This result was consistent with Baris and Tosun (2013) and Brown (2009) where they found that the E-portfolio not only increases the participant's comprehension of their course content, but also increases their IT knowledge and skills.

Next, the study revealed that the **E-portfolio might potentially enhance the learner's motivation and responsibility to accomplish the task assigned**. In the E-portfolio process deployment, one of the features that needed to be executed was performing the task in a group and collaborating with related parties. Group work and collaboration are characteristics of the KEL and CBT. Every member in a group has their assigned task so

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everyone's contribution is important to make the final outcome complete. Through group work, group task and new skills in computer operating and Internet browsing, the students found new ways of gathering information, so their effort and motivation improved. This result was identical to the findings of Ross and Welsh (2008) where 72.2% of the participants agreed that working on the E-portfolio in a collaborative way could enhance their passion for learning and their self-motivation. With proper adaptation of KEL concepts, the E-portfolio implementation during learning could efficiently engage students in the learning process and lead to a high level of student satisfaction.

In addition, one more benefit that has been discovered through this study was that the **E-portfolio system could potentially support the reflection of knowledge and skills throughout the module duration.** The process of the assessment that had been designed for the E-portfolio blended method, such as the execution of practical work and the 'recall and report' approach, encouraged the students to reflect on their practical experiences and illustrate the process in a report. Furthermore, the feedback and comments features also played a major role in contributing to this outcome. The feedback was believed to improve the quality of evidence and thus help to enhance the knowledge and skills development (Joyes, Gray, & Hartnell-Young, 2010). This is consistent with Yusof, Hashim, Hamdan, and Muhamad (2013) where they found that the reflection of the students can occur by making corrections based on feedback and comments. The joint discussion that is derived from these reflections was found to assist students in identifying their learning difficulties, thus helping to increase understanding, retention and achievement.

Finally, the E-portfolio was believed to be potentially beneficial to the institution in terms of **cost saving and enhancing its image to the public, awarding body and industries**. Most of the respondents agreed that, by using the online submission, the cost of paper and printing could be reduced. This had a significant impact on the students where they claimed that they could save money because of this. They were also using the E-portfolio as a secondary storage method for their work instead of printing it out. Mohd Bekri et al. (2013) also mentioned that the E-portfolio has many advantages compared to the printed portfolio, such as the ability to save and organise material more easily. Other than that, the senior

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officer believed that the E-portfolio could enhance the institution's image by getting higher recognition from the awarding body (the DSD). Moreover, the instructors also viewed that, by being exposed to this type of E-learning application, the institution could establish its image with the public and with employers.

6.5.4 Finding 3 - The key factors for the successful E-portfolio implementation in MSTP

Apart from the findings that discovered potential benefits of the E-portfolio in the MSTP, this study has also found information and feedback related to the important matters that need to be taken into account to achieve maximum use of the system, and thus make the implementation successful and meaningful to the target users. In this part, I combine the issues and challenges with the key factors, as the information derived from both themes was related. It was like a 'cause and solution' relationship that needs to be explained coherently.

The first factor is the importance of **E-portfolio objectives and its process** being comprehended by the target users. However, prior to that, the objectives and the process activities must be developed according to the users' needs and must be suited to the programme structure. The activities included in the E-portfolio must stimulate the users to accomplish the task given in order to complete the requirement of the module/subject. As the E-portfolio may be developed in various types of software where specific E-portfolio packages may have an additional advantage in the generation of web folios (portfolios on the web) and different versions of portfolios for different audiences (Jwaifell, 2013), the decision to choose the correct E-portfolio is vital. This is because the slow adaptation by both students and lecturers was reported to have happened due to misunderstanding of the project's objectives, uneven integration of the system with the curriculum, and users' failure to comprehend the process of use (Nor et al., 2012; Ring & Ramirez, 2012). Thus, Mohd Bekri et al. (2013) also suggested a detailed study should be conducted to produce an E-portfolio system which is compatible, easy to use, user-friendly, and attracts the

interest of teachers and students as well as meeting the standard of the vocational education system.

The second factor is the requirement for **holistic assistance and support of all parties**. All parties here means the management, instructors, system's administrator, awarding body and even the industries (employment providers). Meanwhile, the holistic support and assistance means the provision of physical and mental support to the users. Deketelaere et al. (2007) argued that, regardless of whether the portfolio is paper or digital, it requires a considerable amount of time and attention to decide how it would make a difference in the students' learning, and thus the student needs to be motivated and passionate to use this application successfully. Hallam (2008) suggested that, in order to sustain and build a strong future for E-portfolios, the management and community in practice should together give their full cooperation and support. The environment of the system deployment should consistently support and assist the users to maintain their commitment to the system (Owen, 2011). Suggestions of suitable support in the MSTP environment are, for instance, management's reinforcement of the system's importance, instructor's engagement with the students, personal coaching, peer-mentoring strategy and recognition of the participants.

The next factor is the **provision of training and workshops** to enhance understanding and boost users' motivation prior to and along with the system's deployment. The issues that have been raised include lack of users' proficiency in IT skills and some users' difficulties in understanding how to use the system. As Gerbic, Lewis, and Northover (2009) mentioned, the greatest challenge in implementing online learning is to ensure the user is able to use the technology, it is of foremost importance to plan and conduct suitable and comprehensive training and workshops to assist them. The Kipling methods of using the 5W1H concept (What is the E-portfolio?, When and Where to use it?, Why should we use it?, Who should use it? and How should we use it?) is one of several recommended techniques to plan and design good training for introducing a new invention or innovation (Dereli & Durmusoglu, 2010; Lin & Luh, 2009). However, the most significant point is that the training should cover both knowledge and skills items in its content. Hands-on

training on using the system is compulsory. Several previous studies have also stressed the importance of the provision of training and demonstration to the users, regardless of who the E-portfolio has been designed for or implemented and what aims are sought (Abrami & Barrett, 2005; Doig, Iilsley, McLuckie, & Parsons, 2006; Felce, 2011; Hallam, 2008; Joyes et al., 2010; Mills, 2013; Mohd Bekri et al., 2013; Norazman & Rahman, 2013).

The fourth factor that needs to be considered when planning a successful E-portfolio implementation is to **prepare and fulfil the requisite infrastructures and facilities** such as computers and the Internet connection. This fundamental infrastructure is important to maintain the survival of the system, as Owen (2011) and Peacock et al. (2010) stressed that the lack of users' access to ICT facilities is one of the practical barriers to individuals' engagement with the system. The access to IT equipment such as scanner, laptop or computer is essential as well as the provision of reliable Internet access around the campus. This is to ensure that the users have no problem when working with their E-portfolio and are able to explore the Internet to search for information and resources conveniently (Kocoglu, 2008). Even though in the previous research conducted by Ruhizan, Norazah, Rahim, Faizal Amin Nur, & Jamil (2014) stated that the government funded institutions in Malaysia have no problems regarding to the provision of the equipment and facilities, this is not the case in the private/self-funding institutions where they are struggling with their efforts to earn income and to make wise decisions in spending the budget. Thus, to fully implement the system the financial condition of an institution needs to be considered so all the requirements will be sufficiently provided prior to the execution.

The next factor is the **software-related issues** where the software application, database and the materials that complement the system must be sufficiently provided, maintained and taught. It is vital to choose suitable software, platforms and databases, which meet the requirement of the programme and the capabilities of the institution, such as budget, equipment and personnel to take charge. Previous research has provided suggestions and recommendations of E-portfolio software that might suit certain circumstances in an organisation (Barrett, 2006; Himpsl & Baumgartner, 2009). The selection of suitable software is imperative to ensure the success of an E-portfolio implementation. Apart from

the software, the provision of materials and resources related to the software are also useful to help users to operate the software correctly. The person in charge or the system's administrator need to be trained and taught the software so that they are able to solve incoming issues during the implementation.

A cost-efficient implementation is always a priority to an organisation or institution. This fifth factor cannot be underestimated due to its influence in gaining approval from the top management. The implementation should offer low costs yet a high-quality performance in every aspect. The 'open-source' software is always the first option due to its 'free-licence' privilege. Then, the cost of maintaining and renting a host/server for the database should be affordable and reasonable, depending on the capacity of the users (Doig et al., 2006). Even though cost has seldom been openly discussed by certain institutions that run the system, the implicit cost issues include software licences, storage cost, technical support and facilities, and technical maintenance, all of which have to be considered in the early planning stage (Joyes & Smallwood, 2012).

Finally, the last factor that needs to be noted is the **development of a support programme** to be conducted along with the system's implementation. In her research, Felce (2011) suggested the scaffolding framework intended to assist users with different abilities to operate computers. For this study, the suggestion for this programme was prompted by the issues raised by users who were not motivated to try to accept new challenges, and also users with IT-literacy problems. A special approach needs to be organised to cater for certain types of user so that the competent users can continue the session without being disturbed. In my experience, this situation happened because some of the MSTP participants were from rural areas with a lack of exposure to technology and at the same time felt too shy to express their lack of competence in public. Most MSTP students were low achievers in academic education, so the expectations of this project need to remain low. The lesson learned from this research has sparked an idea to propose a scaffolding strategy based on user types that may be useful for future implementation. This innovation is explained later in this chapter.

6.6   Validation of findings through report-and-respond inquiry process

To validate the findings, especially the benefits and the lessons learned from the E-portfolio implementation, an email with those statements and the explanatory notes was sent to the respondents, who were one principal, five instructors and seven selected students. As explained before, I am not including the findings regarding E-portfolio issues and challenges as most of the points were covered in the success factors.

This validation process is important to ensure my interpretation of the data concurs with and matches the respondents' opinions. Each statement provided a blank space for them to give comment or feedback. Nine emails were received out of 13 sent, which were from one principal, four instructors and four students. Most respondents qualified their agreement with additional commentary to explain their view or to expand the explanatory notes given. I chose several significant quotes from the nine transcriptions, where the respondents' comments that have been transcribed from the original language are listed here, thus slight amendments have been made to the basic spelling, grammar and punctuation where necessary.

1) **The potential of the E-portfolio in the MSTP**

   a. An E-portfolio has the potential to be used as a personal showcase collection.

      "Yes, I agree. This system could be a personal collection for those who always involved in the external competition or outside-campus project. They can put the images and their journey to be shared with other people. It could be useful to motivate others."~ Student1

      "Every person has their own interest. Some of them like to capture their best achievement and put it in one place. I can see the E–portfolio could offer that opportunity"~ Instructor2

   b. An E-portfolio has the potential to be used as a supporting material in teaching and learning sessions

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"We do support our instructors to use varied methods of teaching materials so the lesson could be delivered efficiently. Some instructors did take the initiative to teach by visualising practical/hands-on tasks using images in their E-portfolio. I think this method is quite interesting to explore"~ Principal1

"I like it when my instructor shows me videos and images during classes, so we are not bored listening to the lecturer all the time. Our instructor has her own pages with loads of images and a few videos. When showing the picture, she described the lesson behind it"~ Student3

c. An E-portfolio has the potential to be used as online assessment method

"The activities that we had implemented last semester proved that E-portfolio could be a medium for assignment submission and evaluation. Even though the completed participation was low, but still we can accept this new method gradually"~ Instructor4

"I agreed that the E-portfolio could serve as an online assessment method for skills training courses. Perhaps we might have a try with the computer courses first to see how it's going. Then, we can introduce it widely to other courses as well"~ Principal1

2) The E-portfolio potential benefits to the MSTP

a. E-portfolio could improve communication and social relations

"I would agree with this statement. However, my only concern would be the students' attitude either to choose to participate in the community or otherwise. If they do, then the E-portfolio would be a good starting point to get to know each other and initiate relations with the instructor."~ Instructor2

"Yes. As a student, I feel that this type of system can act like social networking sites which provide opportunities for the participants to contact each other through virtual means. Thus, without needing to meet face to face we can share our views and contribute to the group work." ~ Student3

b. E-portfolio could support knowledge and skills' construction

"Agree. Using this system has opened my eyes and increased my knowledge about the broader technology of learning. My computer skills also improved, especially when working with the PowerPoint presentation and Internet browsing."~ Student4

"I can see the positive side of this system in terms of improving the student's ability to use the Internet to search for information and depositing those useful resources in their work, therefore I agree that this system could enhance the student's skill in operating the computer and its application."~ Instructor1

c. E- portfolio could enhance learning motivation and responsibility to accomplish tasks

"Before this, I never knew about e-learning technology. But after using this system, I know that as a student we need to always be alert to recent developments and take a positive view of how this technology could benefit us during the course. My mind opened and I was motivated to accept changes and new knowledge from different angles. We could try harder on the next assignment so the outcomes will be more interesting"~ Student1

"Yes, this system slightly motivates them to complete the assignments. Seems the students were excited to learn about the E-portfolio at the beginning. They were motivated to participate in the community. I can see their motivation to learn had improved. Probably they were tired of sitting all day in their training workshop. It's a new environment for them to operate a learning system."~ Instructor4

d. E-portfolio could support the reflection of knowledge and skills throughout the module

"I quite agreed with this statement. From the student's end result, I can see the improvement of students' presentation of their writing after undertaking a practical skill work. This is happening with the aids of extra resources from websites, instructor's comments and peer assistance"~ Instructor3

"This system helps me to organise the idea when I recall the activities during the practical session. I just simply type in the activities and the lesson gained

from them. Then, I refer to several websites to add value to my work. Even though it took loads of effort to do this, I was satisfied when the finished product was praised by my instructor" ~ Student3

e. E-portfolio may support progress-based learning, yet the instructions must be clearly defined

"Yes. Thanks to the proper instruction explained in the activity sheets, they were following the steps outlined like planning, submitting draft and final submission. However, there were still not many students who took these steps seriously, even though they had been reminded frequently. They were simply submitting the final version. It was just about personal attitude, their willingness and efforts."~ Instructor2

"I follow the instruction in the activity sheet and manuals. I think it helps me to submit the work in chunks. The instructor also supported me to do it like that. Honestly, it's quite tiring to follow the process, but it also teaches us to be disciplined and orderly in our work"~ Student4

f. E-portfolio may have the potential to benefit the institution in terms of cost saving and enhancing its image to the public, awarding body and industries

"Yes... There are certain areas that have a direct impact on the E-portfolio application, such as cost saving on printing and stationery..."~ Instructor1

"The public and the industries will see our college as an 'IT-savvy' institution when this system is fully deployed soon..."~ Instructor3

"If the implementation succeeds, I am glad to say that we can obtain more 'stars' from the DSD [Department of Skills Development] to improve our image to the public and to the prospective learners"~ Principal1.

3) The Key principles or success factors for the E-portfolio implementation in the MSTP

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a. The objectives and the processes of an E-portfolio must be clear and understandable

"This is so true. Why do we implement the E-portfolio? Is it developed for the student or the instructor? Or is it for both of them? The objectives of this system must be fully comprehended by the user so they will make an effort to use the system. Some colleges may want to apply this E-portfolio as an enhancement or value-added program, but it is not possible that other colleges wish to implement the system as an online assessment or skills evaluation method"~ Principal1

"...Absolutely yes. This system is like a new challenge and, for a student, it is like a very daunting process, especially for those who have no background in IT. Therefore, the objectives or scope of the system must be clearly explained and we must take 'baby steps' to introduce to them"~ Instructor4

"This statement is true. If the process is easy, both students and instructors will take less time to adapt and start to use it efficiently"~ Instructor2

"Agreed. The majority of our students are low academic achievers and are a bit slow in adopting new experiences. The instructors as well, most of them only have certificates and diplomas. So, if the E-portfolio could provide the intuitive process, the users will surely get attracted to use the system and find it appealing"~ Principal1

b. Holistic assistance and support to all parties is essential

"This is the very important aspect to ensure the system will sustain in an institution. Support from the management and academic staff as well as the technical team is needed from the beginning of the process until the ends"~ Instructor4

"I agreed that the success of the system really depends on the cooperation of the management, the academic department and the students themselves. Everyone should take the responsibility for this. Otherwise, the system will not last very long in an Institution."~ Principal1

"I agree to say that help and assistance from my instructor and peers would make me confident and eager to use the system"~ Student4

"Yes. Perhaps the students were more comfortable to communicate with their acquaintances rather than the instructor. This technique more or less has had an impact on both parties. The mentors seem to make more endeavours to learn and explore the system in order to teach their peers, while the students show better responses during the session and keep showing their work to the mentors. However, some of them still make less effort and fully depend on the mentors to do the task for them. It is hard to change people's attitude after all" ~ Instructor2

"Yes. As I said before, the instructor's support during the system deployment is very important to keep us using this system. They should be more aggressive to the student who always makes excuses and didn't take part even a single task. "~ Student3

"The instructors are the one that are close to their students in the college. So I think an instructor should become a role model to his students by using the system and promoting the benefit to them. If they acted inattentively, then the same situation will happen with their student. It's not that the management is hands-off with this, but, as I said before, that these instructors know them better than anyone else" ~ Principal1

c. Sufficient training and workshops are important to enhance understanding and boost user's motivation

"Totally agreed with the statement. Both students and instructors should attend a series of training and practical workshops so they could fully understand how to use the system and what benefit it can be to them. Thus, they will be motivated to continue to deploy the system"~ Principal1

"I admit that without proper training, I can't use the system very well. Even though the manuals and documents were detailed, it was still not sufficient to improve my motivation to frequently log on to the system"~ Student4

d. The fundamental infrastructure is of foremost important to maintain the survival of the system

"Truly indeed. The college must provide complete facilities like Internet and computer so we can always update our E-portfolio without queuing or waiting in turn to use the lab. The Internet also should be fast and could support loads of users at one time"~ Student2

"It is undeniable that the facilities play important parts in the success of the E-portfolio implementation in certain courses, like in the Fashion and Electrician courses where there is no established Wi-Fi, which caused the students have to go to the lab, which is quite far from their place. Therefore, the completion rate of students from those courses was low compared to other courses. Other facilities like laptops are not the major concern as they have their own. I hope the management could provide an established Wi-Fi in each place of the courses being taught"~ Instructor2

e. Software, tools and guide materials must be sufficiently provided and taught

"Agreed. The software must be reliable and could be accessed from anywhere, so we can encourage them to use it at home or hostel, not only on the campus"~ Instructor4

"I use the document materials provided by the instructor to guide me while using the system. I think it is useful even though they're supposed to be with the practical guidance to enhance our understanding and yes, the exemplars also work to improve understanding. This support is so true."~ Student1

"In the limited Internet bandwidth here, the student prefers to use the printed manual rather than read on the screen. However, the online materials are also very important to visualise the exemplar of the E-portfolio that had been used in other institutions. Moreover, the guideline from the Mahara website also seems useful to help increase my understanding of the system" ~ Instructor3

f. A cost-efficient expenditure throughout the implementation and maintenance

"I prefer a software that is 'open source' and free licence like this [MAHARA]. It can reduce our implementation costs. Furthermore, we will also be very

pleased if the expenses incurred to implement the system could be minimised and reduced."~ Principal1

"I agree that cost is very important in order to start a new development. However, from the positive side, the E-portfolio also will save our cost in term of printing and project materials like papers. The management should understand this" ~ Instructor2

g. A support program must be planned as a guideline throughout the implementation

"Yes, I agree. This guideline can be referred to any department who wishes to continue the use. The program need to holistically support the users physically and mentally so they will feel secure and confident…"~ Instructor3

"Definitely true. I am sure the management [board of directors wants to see if any program to support those users has been designed to increase the rate of accomplished participants…"~ Principal1

6.7 Validation of E-portfolio features with the E-portfolio Key Indicators

As described in Chapter 2, Literature Reviews, based on the research carried out by Rahim (2015) from the Universiti Tun Hussein Onn (UTHM) Malaysia, the E-portfolio for Malaysian Skills Certification Programme or MSTP should encompass key indicators to ensure the application is utilised according to the standard of training outlined by the awarding body. Therefore, to match and confirm this, **Table 6.4** provides the checklist to confirm that this research study conforms to these indicators.

Table 6.4 The Key Indicators of E-portfolio in MSTP (adopted from Rahim (2015)

No	Key Indicator	E-portfolio features/process	
1	Editing Information	√	E-portfolio provides space to edit users' information and create own pages to be publicly or privately published.
2	Collecting learning material	√	E-portfolio provides space to place materials collected from the Internet sources or users' own materials.
3	Presenting information in various ways	√	The process of E-portfolio states that users are required to publish their work using various types of presentation such as images, videos, documents, spreadsheet or blogs.
4	Posting homework	√	The process through 'progress-based learning' feature requires users to post or publish their work progress to be reviewed and commented on.
5	Guiding students	√	The manual of deployment is supplied to the users as a guideline along with the implementation process.
6	On-line monitoring	√	The instructor should supervise and monitor the students by reviewing and giving feedback on their works. The system's admin also provides online monitoring by using system statistics to identify system usage.
7	Detection of the learning process	√	Through the evaluation rubrics, the instructor can identify and recognise the capability of each student in using the E-portfolio. The quality of work product submitted online can be a benchmark of students' performance in the assigned task.
8	Posting practical work	√	The process pre-requisite where the students need to undertake the hands-on/practical work prior to report development. The report should include activities during the practice. This outcome needs to be posted on their E-portfolio pages.
9	Online discussion activities	√	The forum features allow users to discuss among themselves as well as with the instructor.

10	Test in the form of multiple-choice answers	NA	The E-portfolio deployment only focuses on practical tasks and assessment. It was blended with the current traditional method where the theoretical part was still using paper-based assessment and paper-based score records.
11	Test in the form of short essay	NA	
12	Overall score testing	NA	
13	Formative test	NA	
14	Summative tests	NA	
15	Comments by teacher	√	There is a feedback space on every page developed by the student.
16	Assessment verification	√	The assignment was verified manually by the instructor based on works uploaded on students' pages.
17	Space for sharing ideas	√	The forum and public pages are open to all users to share ideas.
18	Space for sending message	√	There is a private chat messaging function in the system.
19	Space for reflection	√	The comments and feedback provide space for student to reflect on their mistakes. Other than that, the report development also supports reflection through a recall and report process.
20	Space for communication between the students and their classmates	√	The forum function allows users to communicate based on topics initiated. The forum is open to class group and inter-class groups.
21	Space for communication between teachers and students	√	For private communication, they are using the chat messaging function.
22	Space for communication between the students and the students from other classes.	√	

It can be seen that most of the indicators were fulfilled by this research study, thus suggesting that this research into E-portfolio implementation in the MSTP has been satisfied according to the standard of training outlined by the awarding body. However, further research needs to be planned to ensure that all the indicators will be fulfilled.

6.8 Discussion on adoption of KEL, CBT and Threshold concept

In this research, the combination of KEL and CBT seemed to work with each other where KEL acted as a base for the student to reflect from prior learning, plan the next activities, organize and execute the activities and collaborate with the team members. The elements of KEL which are communication, experience based learning, reflection on previous experience and focusing on student's responsibility to accomplish the task have been embedded in the E-portfolio activities that need to be executed by the student. The CBT criteria were placed in order to maintain the quality of the work so that the final product achieved the level of competencies that have been standardized. CBT elements such as progress based learning, knowledge and skills construction had enhanced the E-portfolio activities so that the students had more directed guidelines on how to produce a quality and competence-achieved work product at the end of the session.

Other than these two approached, this research also adopted the 'threshold concept' that was introduced by Joyes et al. (2010). They suggested the five elements that were important need to be decided prior to E-portfolio implementation. These were: purpose, learning activities, E-portfolio process, ownership and planned transformation. These elements had contributed to make this research more directed, organized, practical and feasible. I adopted all these elements as a guideline throughout the study. The major part that helped me to conduct this research properly were the E-portfolio process and planned transformation. After reviewing the requirements of these elements, I started to find applicable theories and approaches to plan the E-portfolio process and suitable contingency strategies if any transformation was needed. I recommend to other organizations who wish to start introducing the E-portfolio or E-learning system to adopt this approach prior to the implementation.

Apart from the findings on exploring the E-portfolio as learning tools, this research also has discovered few strategies to assist users engaging with the system. The framework that

match assistance needed with user types has been developed based on responses of the interviews data. Section below elaborates more about this framework.

6.9   The Framework of scaffolding needed based on the User types: The Researcher's Innovation

From the interviews with the respondents, it is clear that the biggest challenges in the E-portfolio deployment are the user attitude and the support needed to ensure the survival of the system. This support is required for both instructors and students who are recognised as lacking the capability to use the system, and for people who demonstrate issues of negative personal attitudes. Despite the objective of this support being to assist the user, some of the strategies like merit for participation can increase users' motivation to continue using the system.

Determining the types of user can be conducted by the instructor based on the Rubrics of Assessment and the statistics of use from the administrator's page in the E-portfolio. The head of department or the supervisor can identify the capabilities of the instructor based on the annual skills and performance appraisal. This technique is recommended to be used in the coming implementation with a proper plan on how to put it into real practice.

6.9.1   Types of User

Three types of user were identified along with the project implementation. There are two dimensions that need to be taken into consideration before any decision concerning assistance and guidance could be offered. The dimensions are 'IT competency or proficiency' and 'User's motivation'.

Type 1 (Competent-Motivated)
The first type of user consists of a group of people who possess acceptable competency in operating IT (computer and applications) and also are recognised as having a good attitude and passion to learn and take new challenges. This 'Competent-motivated' user is expected to score marks in the range of 70-100% in the rubrics of evaluation.

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Type 2 (Incompetent-Motivated)

The second type of user is a group of people who lack competency in IT literacy, and thus require more attention and assistance in this area. Despite being incompetent, people in this group show satisfactory behaviour and determination to take on new challenges. This 'Incompetent-Motivated' user includes people who get scores of 40-69% in the rubrics of evaluation.

Type 3 (Incompetent-Unmotivated)

The last type of user is a group of people who have a poor level of IT competency as well as having issues with their personal attitude and behaviour where signs of refusal to learn are shown. This type of user needs more attention with the aim of increasing motivation and at the same time assisting them with their IT skills. This 'Incompetent-Unmotivated' user includes people who score 0-39% in the rubrics of evaluation.

6.9.2   Scaffolding Techniques

There are a few techniques and assistance that have been developed by incorporating the previous literature and the suggestions from the respondents. These ideas have been put down on paper and have been reorganised to come out with a holistic plan.

E-portfolio Workshop/Training

The E-portfolio workshop and training should cover a complete delivery of information and practical training as well. The importance of this training prior to and alongside the system deployment has been mentioned in previous research into E-portfolio implementation (Kocoglu, 2008; Krämer & Seeber, 2009; Ring & Ramirez, 2012; Zainal-Abidin et al., 2011). It stated that, with proper training and information dissemination, the E-portfolio can raise user's motivation and comprehension of the objectives of use. The workshop must also be led by a skilled demonstrator so the hands-on training can be executed. This training should be compulsory for all types of user, despite their IT skill and behaviour. It is like an induction course which introduced users to the aims of the application and demonstrates how to use each function in it to achieve that aim.

IT Literacy Support

The IT literacy support should cover the training or courses specifically on IT-related use, such as hardware operating, software use, Internet applications and other related courses. These extra classes/courses can be conducted once or twice a week to improve the users' IT skills. The essential skills, especially on how to use Microsoft Office, Internet applications and basic functions of hardware like scanning and file transferring from other devices, need to be learned and mastered in order to make the E-portfolio deployment easier. Kocoglu (2008) also suggested that extra attention on IT skills should be taken into consideration in order to achieve optimum use of the system. This second technique is recommended to be applied to type 2 and 3 users who have difficulties in IT literacy regardless of their behaviour.

Holistic Motivational Support

The holistic motivational support is a support that aims to increase the motivation of users who lack confidence and have an attitude like personal inhibition, shyness, and rejection of new developments. Holistic here means that it is vital to plan the support in every possible way such as conducting a motivational course or training, focus group or personal consultation with the counsellor or organise visits to another institution or industries to see how other people work. Kicken et al. (2009) agreed that advising and consulting learners could improve motivation and strengthen their self-confidence to join the community and take part in activities. This strategy is dedicated to type 3, who are incompetent and who also experience issues relating to their attitude and behaviour. Therefore, it is hoped that this holistic motivation support could cater for the attitude issue so the users can develop their self-esteem and raise their confidence to continue with the E-portfolio use along with other users.

Personal Hands-on Consultation

A personal hand-on consultation is where a one-to-one teacher (mentor/trainer) per user is needed. This is to cater for the type 3 users who are incompetent and unmotivated. This is because some of them have issues like shyness, which means that they do not like to be

given advice publicly. This personal hands-on method aims to provide extra training on the use of the E-portfolio. It is unlike the motivational support strategy described above, where this technique is more on guiding users to use the system personally. It is like personal tutoring for the user so he/she can ask questions without feeling shame or hesitation. Personal tutoring like this can stimulate and develop the users' interest as well as providing quality advice on the system's use (Zainal-Abidin et al., 2011).

Peer-mentoring

The peer-mentoring technique was implemented with the 2014 cohort and received positive feedback from the participants. Thus, this approach should be continued for future implementation with further improvements, such as providing more mentors, creating a smaller group for coaching, and designing special training for mentors to strengthen their skills. Ring and Ramirez (2012) suggested students were more likely to ask favours of their friends or acquaintances. It is hoped that this peer-mentoring could maintain the users' motivation to use the system, especially for the type 2 and 3 users. In addition, the mentor can create a community of use for their group and connect with other groups to make the use more interesting. Peacock et al. (2010) mentioned that the users' participation in a community can create a meaningful ambience for the users and this connection will enhance the possibilities of sharing ideas and socialising.

Merit of Participation

Merit means recognition given from a higher awarding body or upper-level management to show appreciation of the contribution or efforts that have been made in a certain area. The merit is not bound only to prizes but can also be a letter or certificate of appreciation or award. However, depending on the institution's budget, the merit can also be a voucher or a prize. These merits should be organised to raise users' interest and improve their motivation to accomplish the E-portfolio use until they completed the tasks assigned. Krämer and Seeber (2009) and Ring and Ramirez (2012) also suggested that, by giving appreciation to the users, they will feel that all their hard work and efforts have paid off. This strategy is meant to be applied to all types of user, with the hope that it could enhance their motivation and passion to use the system and maintain their fidelity to it.

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Table 6.5 illustrates the proposed scaffolding techniques based on the user types that have been elaborated previously.

Table 6.5 The Scaffolding Technique Based on User Types (Source: Self-study)

Scaffolding \ User	Type 1 (Competent - Motivated)	Type 2 (Incompetent- Motivated)	Type 3 (Incompetent- Unmotivated)
E-portfolio Workshop/ training	√	√	√
IT Literacy Support		√	√
Holistic Motivational Support			√
Individual/Personal Hands-On Consultation			√
Peer-mentoring		√	√
Merit of Participation	√	√	√

6.10   Conclusion

It can be seen that the findings have received positive feedback for the validation of 'report and respond' inquiry process as well as being validated by the E-portfolio indicators outlined by the previous study. The research questions have also been answered by the findings and put into tables to ease understanding. Additionally, in this chapter I have described the research limitations and challenges that I encountered in order to achieve completion of this research. Apart from explaining the research findings and discussion, this chapter has also presented the innovation of my project, which was the scaffolding technique that has been suggested to become a guideline for those who intend to implement the E-portfolio system in the MSTP.

The next chapter will elaborate more about the future research to be taken and suggestions for future development and application of the E-portfolio in the field of MSTP and TVET.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

FOR FUTURE RESEARCH

7.1   Introduction

In this chapter, the final perspectives of the project are presented. The contribution of the research is discussed to match the research objectives that has been set. The project's impacts and the contribution to the community of practice are also explained to show how the project affects the Malaysia Technical and Vocational Education Training field.

With aims to imminently expand the E-portfolio implementation, this research recommends that use of this application be proposed to the Skills Training Education policy makers, so that it can be developed as one of the skills standards enacted in the sector. The research limitation and challenges are elaborated to explains constraint that have been experienced during this research.

Finally, the reflection on this challenging journey is also described, to show how this kind of experience has provided me with an abundance of innovative knowledge and skills.

7.2 Evidences indicating that the research objectives have been met

This research was intended to explore the use of E-portfolio application in the environment of the Malaysian Skills Training Programme. The benefits, the issues and challenges, the opportunities and the effectiveness of the application have been clearly described earlier in this chapter. The main question of this study has been supported by the answers of the sub-questions. Therefore, to summarise and match the initial research objectives with the findings that have emerged, **Table 7.1** below summarises the research objectives with the outputs gained throughout the project.

Table 7.1 The Evidence Checklist of the Research Objectives

Research Objective(s)/Research Question(s)	Evidence from Quantitative Analysis	Evidence from Qualitative Analysis
Main question:		
To what extent can the E-portfolio Application perform as an effective learning tool in the Malaysian Skills Training Programme (MSTP)?		
Sub-questions:		
1. What are the potential of the E-portfolio application to be implemented in the MSTP?		The potential proposition for the E-portfolio is as follows: An E-portfolio as a personal showcase collection, supporting materials for teaching and learning and for online assessment. *(Chapter 5, 5.11)*
2. What are the potential benefits and limitations of implementing the E-portfolio application in the MSTP?	The E-portfolio implementation through its processes could benefit the teaching and learning in the aspect of: i. E-portfolio could improve communication and social relations ii. E-portfolio could support knowledge and skills' construction iii. E-portfolio could enhance motivation and responsibility to accomplish tasks iv. E-portfolio could support the reflection of knowledge and skills throughout the module v. E-portfolio may support progress-based learning, but the instructions must be clearly defined vi. E-portfolio may have the potential to benefit the institution in terms of cost saving and enhancing its image to the public, awarding body and industries. *(Chapter 5, 5.9 and 5.11)*	

	The issues identified are as follows:
	    i. Personal attitude and behaviour
	   ii. Lack of user's IT proficiency (both student and instructor)
	 iii. Lack of training and support from the management, instructor and system's administrator
	 iv. Insufficient facilities such as computers and Internet
	 (Chapter 5, 5.9 and 5.11)	

3. What are the key factors to achieve a successful E-portfolio implementation in the future?	The factors that could contribute to the E-portfolio's successful implementation were identified as follows:
	     i. The objectives and the processes of an E-portfolio must be clear and understandable
	    ii. Holistic assistance and support of all parties
	   iii. Training and workshops to enhance understanding and boost user's motivation
	   iv. The fundamental infrastructure is important to maintain the survival of the system
	    v. Software, tools and guide materials must be sufficiently provided and taught
	   vi. Cost efficiency throughout the implementation and maintenance
	 vii. A support program must be planned as a guideline throughout the implementation process.
	 (Chapter 5, 5.9 and 5.11)	

7.3   Research Contributions

This research has been successfully accomplished and has resulted in providing the key information required for E-portfolio implementation in the Malaysian Skills Training Programme (MSTP). Other than that, the scaffolding framework based on the users' motivation has also been outlined, so it could serve as a recommendation to any organisation or institution that wishes to run the E-portfolio application.

Looking back at the research questions, which were to investigate the effectiveness of the E-portfolio system as a learning tool in MSTP, this research has found the answers based on the evidenced gathered from both quantitative and qualitative methods. Although there were problems, such as lower completion rates, long distance monitoring by the researcher, low number of respondents on survey and a few concerns regarding data analysis, the final findings suggested that the E-portfolio system has good potential to be introduced and implemented in MSTP. The three potential purposes discovered were personal compilation or showcase collection, teaching and learning tools and online assessment. The E-portfolio could also improve student's motivation, learning responsibility, the progress based learning, knowledge construction and reflection, communication and could also enhance the institution's public image. Then, through the information and responses gathered from the interviews as well, this research proposed a framework for scaffolding techniques that might help institutions in the MSTP sector to plan and organize strategies towards the successful implementation.

Although the research into the E-portfolio system has been widely implemented across all countries, this technology seems very new in Malaysia (Mohd Bekri et al., 2013; Ruhizan et al., 2014). Therefore, in order to introduce this system to the education sector in Malaysia, it can be assumed to be a new learning innovation. Hence, this research contributes discovery of the users' experiences of the MSTP in accepting and utilising an E-portfolio during a training course. This new practice in the MSTP has shown that the E-portfolio system could have the potential to be implemented in the programme through careful planning and action. This research also seems to open a 'new door' into the

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institutions that were involved with the project. The management has developed an interest and started to explore more detail about electronic learning. The project's impact is further described as follows:

i.   The dissemination of E-portfolio technology to the TVET groups/personnel on social networking websites. The research has been shared with groups of Malaysian TVET personnel on Facebook. Some feedback and comments were discovered and this phenomenon indicates that an E-portfolio might have wide potential to be introduced to organisations and institutions across the country.

ii. The pilot institution has suggested hiring a permanent administrator to manage the e-learning system in the college and introducing a Learning Management System (LMS) along with the E-portfolio application. If this proposition is approved and takes place, it will help the E-portfolio system to be implemented and explored widely for all courses.

7.4   Future Recommendations

7.3.1   *To propose the E-portfolio application to be one of the subjects in the National Competency Standard (NCS) – Malaysian Skills Training Programme*

National Competencies Standard (NCS) is defined as the specification of the competencies required for skilled workers in Malaysia in a specific field of work that meet the needs of the industry. Currently, the NCS module in which every student must be trained despite their course field is the NCS-Core Abilities (DSD, 2012b).

Core Abilities are considered essential for effective participation in the emerging patterns of work and work organisation. They focus on capacity to apply knowledge and skills in an integrated way in work situations. Core Abilities are generic in that they apply to work generally rather than being specific to work in particular occupations, jobs and industries. This characteristic means that the Core Abilities are not only essential for effective participation in work but are also for effective participation in further education and lifelong learning.

Students who have successfully completed the NCS Programme will receive a certificate of merit to indicate that they have passed the competency of this Supplementary Programme. As of June 2014, 16 NCSs had been developed to be specifically applied by certain fields as elective subjects (Figure 7.1). Only NCS-Core Abilities must be taken by students on all the courses, while the other NCS are to be taken only by students in the relevant field. (Please refer to Figure 7.1 for the NCS that have been developed.)

	STANDARD KETERAMPILAN KEBANGSAAN (SKK)/ NATIONAL COMPETENCY STANDARD (NCS)		
	Nama SKK/ NCS Title	Kod/ Code	Bilangan/ No.
1	Kemahiran Teras/Core Abilities*	Z-009	1
2	Teknologi Maklumat & Komunikasi / Information & Communications	Z-003 Z-010 Z-011	3
3	Pembinaan/ Construction	Z-004	1
4	Pekerja Asing/ Foreign Workers*	Z-005 Z-006 Z-007	3
5	Industri Halal dan Produk Halal /Halal and Halal Products	Z-020	1
6	Kawalan Kualiti / Quality Control	Z-030	1
7	Fabrikasi Peralatan Bertekanan, Fabrikasi Paip dan Saluran Paip dan Pembuatan Kimpalan Industri/ Pressurised Equipment Fabrication, Piping & Pipeline Fabrication & manufacturing Welding Industry - Underwater Welding -	Z-040	1
8	Teknologi Hijau/ Green Tech	Z-050	1
9	Keselamatan/ Security	Z-060	1
10	Train of Trainers	Z-070	1
11	Occupational Standard Development Facilitator	Z-012	1
12	Cultural Heritage Specialist Guide	Z-013	1
	Jumlah NCS/ Total of NCS		16
	*NCS tidak ditawarkan untuk program persijilan / NCS is not available for certification		

Figure 7.1 The National Competency Standard (NCS) Registry (source: DSD, 2014)

Therefore, the proposed extension of this research is to develop a curriculum for the NCS-E-portfolio application to be applied in the areas of Information Technology (IT), such as

Multimedia, Information Systems and Computer Systems. This standard could have the potential to enhance students' knowledge in the field of computers and make learning more relevant with the current technology. The decision to develop this NCS is also aimed at making vocational education and training more effective and more directly related to industry needs, as this additional experience could enhance the transfer and application of skills and knowledge to new situations and working environments.

The steps below illustrate the procedures that should be taken into action when considering how to develop the NCS curricula (DSD, 2012a):

iii.   A discussion with the department officers from the Ministry of Human Resources while submitting the initial proposals with relevant explanations for developing the NCS.

iv.   To propose qualified panels consisting of professional and technical personnel to contribute to the development of this NCS curriculum structure.

v.   To conduct an initial consultation session with the approved panels and relevant personnel regarding the direction of the NCS and charting the curriculum development in the series.

vi.   Conduct the curriculum development by adopting the DACUM (Developing A Curriculum) Job Analysis and Task Analysis process as typically applied by the Department of Skills Development.

vii.   Execute a field test of the curriculum described in the document and provide critical feedback for its improvement and further development.

viii.   Submit the improved, extended curriculum to the ministry for review and verification.

ix.   If any corrections need to be made, the revised NCS should be held back until the required amendments can be discussed. Otherwise, the NCS can be published and distributed to the accredited centre to be executed accordingly.

However, these suggestions and ideas require a lot of approval and involvement from the ministry and industry as they involves changes in policies and procedures. I hope this proposal will be approved for consideration.

7.3.2 *To continue using this application in current skills training institutions and enhance a few components to improve viability*

My future plan for this project is to continue the implementation of the E-portfolio application in my skills training institution with added features like Blackboard or other learning management systems available in the market. With the information gathered from this study, I can anticipate the issues, requirements and factors that will be faced during the implementation. Thus, strategies need to be prepared to encounter those barriers so that the plan will be executed smoothly. The identification of user capability, the training and workshops, the provision of facilities and the intuitive process deployment will be taken into consideration prior to implementation. At the same time, I have to obtain support from the management to fund this project and to encourage the instructors to use it so they will give their cooperation and assistance to achieve the project's aim.

7.3.3 *To promote the use of this application to other private and public skills training institutions by conducting workshops and seminars*

The long-term proposition for this project is to disseminate the benefits of this application to other private and public skills training institutions so they would have an opportunity to explore and become familiar with the system gradually. When the community of users becomes larger, it could develop wider connections with skills training members around the country. I would also like to organise a workshop or seminars on how to operate the E-portfolio using the MAHARA software application. Through this event, the E-portfolio functions can be promoted and highlighted, especially for the Malaysian Vocational Education Training.

7.5 Future Research & Development

To ensure research continuity, future research could be planned along the following lines. The E-portfolio could be developed and tested by using different types of application such

as Web 2.0, Moodle, PebblePad and other software offered on the market. As mentioned by Barrett (2006), each software package has its advantages and disadvantages. It depends on the institution's capacity and capability to subscribe to suitable software by considering factors such as facilities, scope and objectives and financial situations.

My plan after I have been re-employed, as has been detailed in section 7.3.2 and 7.3.3, are to continue the use of the E-portfolio, improvise the processes and promote the use to all courses on the campus. Then, the post-implementation study needs to be planned and conducted. The most important post-execution study is to evaluate the maturity of the E-learning or E-portfolio system usage among the skills training institutions and investigate the factors that could contribute to the system's maturity and sustainability. This study might deploy the theory of the Technology Acceptance Model (TAM) or other suitable theories/models of system maturity and robustness.

Thus, the findings of the research could be a guideline to another organisation that wishes to seriously execute the system as part of the learning process or for an institution that wishes to establish and optimise its current implementation of an E-learning application.

7.6   Research Challenges and Limitations

All research is limited and faces an abundance of challenges. Indeed, no research is perfect and this study is no exception. Firstly, this study is limited because it only focuses on one skills training institute, and thus there was only a low number of participants. I admit that it was not easy to approach several institutions and gain approval to work in them as a research participant. Therefore, I finally decided to continue with this project even though only one institution responded. However, I still feel grateful because the management gave full cooperation and consent to contact and liaise with the instructors and students, even though I was conducting the project from a few thousand miles away.

Then, I faced a greater challenge where the number of students who successfully completed the project was only half of all students. This situation was extremely frustrating for me,

as I had given all my effort to promote the use, provide the guidelines and communicate with them to disseminate the information. However, I observed that the long-distance monitoring and the relationship between me as the researcher and them as the research participants had created a gap that gradually widened from time to time. From my almost 10 years' teaching experiences in the MSTP, the typical behaviour which tends to early surrender in a voluntary-based activity was still happening. They failed to see the benefit of experiencing a new challenge and chose to stay in their 'comfort zone'. More effort and hard work needs to be developed and organised to overcome this issue for future deployment.

For that reason, there were limitations placed on the quantitative data due to the lower completion rate thus causing lower numbers of respondents completing the survey questionnaires. The small number gathered made the findings less reliable and there are doubts about generalizing the findings to MSTP as a whole. In addition, this research was implementing as a self-report approach which tends to influenced by the researcher's view. This Hawthorne effect suggests that the researcher might bias the data (Cook, 1962). I admitted that sometimes I made my own judgement or personal opinion based on my experiences working in MSTP environment for long time. However, to minimize the effect, the validation technique of member checking took place in order to review and check the findings so that it was not claimed by my own preferences. For future research, the naturally collected statistics or natural data would be more relevant and needs to be considered as primary source of findings.

On the other hand, the E-portfolio that was deployed using MAHARA software seemed to receive mixed feedback. Some participants claimed that it is a 'hard to understand' software type for a novice learner. However, these participants (either instructors or students) had never tried any E-learning application before, and thus it was difficult to compare which software could satisfy them as being 'easy' software. Therefore, for further research, maybe different applications could be introduced and tried out such as Web 2.0 or Pebblepad.

The focus of this project was also limited to be used only for Performance assessment. This is due to the recommendation of the instructors during the preliminary study where they preferred to focus on one area for the trial. As each student in the MSTP was obliged to attain both Knowledge and Performance evaluation, the E-portfolio could be explored for use in both assessments in the future.

Finally, the unforgettable challenges of this study were the process of data collection in both methods. The issue of having few participants for the questionnaires caused difficulties in choosing which statistical test could give acceptable results. This situation was salvaged by the qualitative methods, which were interviews via email and Facebook communication. These qualitative data have provided rich data and complete the shortage of the quantitative part. Even the communication via Facebook required a great deal of care due to the privacy and confidentiality issue; I managed to overcome this concern with the cooperation of the participants. The time difference between UK and Malaysia, which is 7-8 hours, made it more difficult to set up real-time conversations. However, as this project is very valuable and I put all my effort into it, I stayed awake until dawn during the conversation sessions. Personally, even though the project only achieved a completion rate of 58-69% of the initial participants, it has taught me through different kinds of experience, the ups and downs, and the vagaries of other people's lives, and of course I am proud of it.

7.7   Personal Reflection on the PhD Journey

As a researcher with an Information Technology (IT) and computer education background, it was difficult for me at first to understand the nature of social research. Terms like ontology, epistemology, educational philosophy and education theories seemed strange and hard to digest, even though the process of reading was repeatedly performed. My mind, attitudes and skills in technical computers and software applications still overshadowed me, thus influencing the way I ran this research. My 10 years' experience of teaching and conducting training for skills training students were also not much help in comprehending the meaning of educational philosophy and research paradigms. This was because I was a practical trainer who taught through the instructional schemes and had been involved with

hardware and software in those years. Thus, all I had in my mind was just to apply my skills and knowledge in the computer field by introducing and implementing this E-portfolio system in the skills training programme so the trainees and trainers would benefit from its advantages and opportunities.

Therefore, to overcome my lack of knowledge of the philosophical part, I began to enhance my effort to read about education theories, especially those relating to Skills Training education, vocational education and training, E-learning theories and the theories of user behavior. Those journals and articles helped me to illustrate the application of the theories into practice. After I went through the synthesis and analysis of the resources, I chose to focus on theories that have a close relation with the nature of Skills Training education, like the CBT, behaviorism, KEL, instructional-based learning and problem-based learning. I also gathered opinions from the instructors and government officers during my preliminary study to develop an understanding of how students learn during class and practical work on divergent courses. This experience of developing knowledge through reading, synthesizing, communicating and comprehending is precious and valuable, apart from managing the project itself. It is a journey that will never be forgotten and will always be my inspiration to move forward in this research once I am re-employed in my previous institution.

7.8 Final Conclusion

MSTP has increasingly seen various improvements and changes in the contents and mode of delivery of training modules. Now it is time to introduce an electronic learning system to the trainees, from level 1 to 5.

This thesis is an academic chronicle of an exploration of Electronic Portfolio use in the Malaysian Skills Training Programme, which is a sub-division of the Malaysia Vocational Education system. The E-portfolio had been successfully implemented in two cohorts. In

the first year (2013), the application seemed to have been moderately accepted but issues such as lack of assistance and poor infrastructure were raised. In 2014, a change of strategy took place as the peer-mentoring approach was adopted along with the system's use. The Rubrics of Assessment showed that, in both years, the post E-portfolio deployment scores were improved compared to the pre-deployment scores. The survey questionnaires for both years also revealed that the E-portfolio process that had adopted KELnand Competency-Based Training theories seemed effective in helping users to engage with the system. The e-mail interviews, the Facebook communication and postings indicated that E-portfolio has the potential to be an assessment medium, a personal showcase and an add-on to the teaching materials. Issues that need to be considered were also revealed, such as providing an equipped infrastructure, running E-portfolio training and workshops, offering system, technical and institutional support, and, finally, combatting the presence of unmotivated users.

Despite the results of the quantitative analysis showing that there were no significant differences between courses when using the system, the qualitative analysis revealed contrasting findings. Most of the respondents agreed that students from the computer courses were more competent when using the system due to their higher level of Information Technology (IT) literacy. Thus, it is imperative to equip the users with basic IT skills. Finally, from the evaluation of the E-portfolio implementation in the MSTP, this study has discovered the E-portfolio's potential purpose, its benefits and the success factors that have been reflected by the issues raised. This study has also proposed a scaffolding framework that suggests diverse supports are needed for certain types of E-portfolio users, and hopefully can be a reference to any MSTP organisation that wishes to explore this E-portfolio in their learning environment.

The adaptation of KEL, CBT and the Threshold concepts have shown significant impact where the main features in KEL which is experienced-based learning was fully adopted and suited with the CBT concept.. The threshold strategies also seemed to work and assisted the researcher to meet the direction and become main guideline to plan,organize and conduct the system's implementation. Each threshold holds specific importance that contributes to the smooth and directed execution.

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The project outputs and research findings that I have presented in this thesis show that my work has advanced knowledge in this subject and has impacted on practice at one of the MSTP training centres. However, due to limitations such as long-distance monitoring, demotivated users and untrained instructors, which led to lower numbers of completed participants, this project is recommended to be further researched for the second implementation with more improvement and holistic support from all. It is hoped that this E-portfolio application will be tried out in MSTP training centres across the country, so the benefits could be harnessed to upgrade both students and instructors' knowledge and skills.

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