STUDENTS' PERSPECTIVES ON THE ENGAGEMENT OF ELECTRONIC PORTFOLIO AS A TOOL IN CLASSROOM INSTRUCTION

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ABSTRACT

The current digital technologies in the forms of electronic learning have placed electronic portfolio as an area of interest in various disciplines of education. Within the field of engineering, e-portfolio enriches students' university experiences; both hard and soft skills, and prepares them for a career in their chosen area. The purpose of this study is to investigate the implementation of e-portfolio as a part of engineering undergraduates' coursework assessment by analysing their perceptions and experience of the concept of e-portfolio in a classroom. The study involved 58 students of Universiti Teknikal Malaysia Melaka, who answered two questionnaires. The findings indicated that the majority of the students felt that e-portfolio is an excellent learning tool and should be embedded into their course instruction as it enables them to improve on their hard and soft skills. However, some students also showed reluctance to have the concept of e-portfolio replacing their traditional methods of assessment. This study signifies the possibility of bringing technology of e-portfolio into Malaysian engineering students' classroom. It is hoped that students can gain valuable knowledge and experience from the technology.

Keywords*: students' perspectives, engagement, electronic portfolio, tool, classroom instruction*

INTRODUCTION

Fast developments in digital technologies are currently influencing instructional practice. The electronic learning enables instructional content or learning experiences to be delivered by computer-based technology, such as the Internet. The culmination of these technological advances and recent curriculum reform efforts are the current online portfolio practices which are aimed at complementing the growth of e-learning. Electronic portfolio as a mechanism of e-learning is boasted to be one of the prevalent innovations in campus technology, and is claimed to have a greater potential to alter higher education at its very core than any other technological applications known so far (Wolf, 1999). The level of interest in e-portfolio is evident as student portfolio development is at present an area of activity on many campuses.

A specific definition of e-portfolio describes it as "a purposeful collection of work, captured by electronic means, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas" (Wiedmer, 1998). It can be created for many purposes and can accomplish many different tasks, such as teacher evaluations and student self-assessments (Lankes, 1995). The history of portfolio started with the paper-based portfolio type which gained popularity in 1980's, thus the escalating use of computers in language learning and teaching have evolved it into e-portfolio. The

use of portfolio is a relatively new growth in the education world. Even as recently as 1990, its use was not very well-known (Polin, 1991), thus the concept of e-portfolio is an even more recent innovation. However, the past several years has witnessed a tremendous growing of interest in the use of e-portfolio in education. The idea first caught on in the elementary and secondary schools in developed countries and lately spread to higher education. E-portfolio as being used in education realm allows the opportunity for students to digitise and electrify the portfolios they produce and this has much to do with the improvement in the accessibility of technology in schools and higher institutions.

One of the reasons why students are attracted with the concept of e-portfolio is for the basis that it enables them to embrace hard as well as soft skills required to survive in school as well as working world. These generic skills can be found in the constructs of e-portfolio itself. Soft skills refer to the cluster of personality traits, facility with language, personal habits, and optimism among people. These skills complement hard skills, which are the technical requirements of a job (Daily Express, Sabah, 26 June 2005), thus they can play a role in the success of an organization. In Malaysian education, soft skills are becoming ever more important, thus the idea of having the concept of e-portfolio as a part of classroom instructions is indeed appealing.

In today's competitive global economy, to be equipped with mastery of knowledge alone is insufficient. Industries are demanding more from the graduates: critical thinking and problem solving skills, continuous self-learning abilities, in addition to teamwork and communication skills. Complaints regarding the lack of professional and soft skills in engineering graduates have often been heard. This is not just a local issue, but also a global concern. For example, the US Accreditation Board for Engineering and Technology requires that from 2001 onwards, Engineering Schools in the US must demonstrate that their graduates possess generic and professional skills (Rugarcia, et al., 2000). Thus, this might explain why the concept o e-portfolio is now growing in use and acceptance abroad, as it presents within it the elements of soft skills which are much in demand by industries.

Although the use of e-portfolio in engineering education is still in its infancy, the notion that it could provide the undergraduates with an environment to display and reflect on their accomplishments makes it highly interesting. To add to this, it could also provide them with a more student-centred touch in the areas of assessment, accreditation, and generic skills of their course work and development as future engineers. This can give them a better sense of how they fit within the larger realm of engineering. And as adoption increases, more stakeholders of e-portfolio will learn to leverage its primary advantages especially the students and industries related to them.

Even though it is generally agreed that e-portfolio has immense prospective to engage students and promote deep learning, student perceptions of the value of e-portfolio for their learning have been barely touched by many researchers. This is due to the fact that much of the research available today on the issue of e-portfolios has focused mostly on faculty and institutional perspectives but not so much on students as the owners of these portfolios (Fleming et. al., 2005). Because e-portfolio is a tool with the "potential to alter education at its very core" (Barchfeld, 1997), the students' perspectives on them need to be explored. Failure to find students' perspectives, feelings and preferences in the use of e-portfolio as an integral part of their educational experience would result in failure to see the potential impact that e-portfolio could have on learning. Students' view on e-portfolio, be it positive or negative, should be explored and put a value by the faculty or institution.

The theoretical framework of the study was designed according to the interests of four main stakeholders of e-portfolio: the industry, faculty, administration and student (refer to Figure 1). These four stakeholders formed the concept of e-portfolio and are constantly communicating with each other because they share the same constructs which appeal to them in terms of the benefits that the constructs bestow upon the stakeholders. The constructs which generate to these characteristics are: learning, employment, assessment and visibility. Each stakeholder benefits from certain constructs which support the development of e-portfolio.

Figure 1. Four major stakeholders of e-portfolio (Singh & Ritzhaupt, 2006, p. 3).
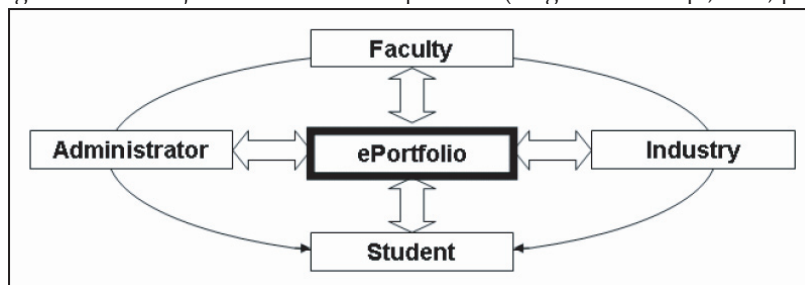
These constructs hold the interaction between all the stakeholders so that they are continuously connected and supported by each other (see Figure 2). The final and ultimate entity who would benefit most from the cycle of framework is the students, because in general, all the benefits gained by the other three stakeholders would go back to the students.

Figure 2. Constructs of Stakeholders Interests (Singh & Ritzhaupt, 2006, p. 4)

Stakeholder	Construct
Industry	Employment and Visibility
Student	Learning and Visibility
Faculty	Assessment and Visibility
Administration	Assessment and Visibility

The objectives of the study are:
1. To find out the students' general attitudes towards the concept of e-portfolio.
2. To know the students' perceptions of e-portfolio as a learning tool.
3. To examine the students' feeling of having e-portfolio as a part of their course assessment.
4. To investigate on the students' opinion of using e-portfolio as a tool in job application.
5. To analyse the students' level of comfort in showcasing their e-portfolio.
6. To know whether e-portfolio contributes to the engineering students' acquisition of soft skills.

This study on finding students' perspectives, attitudes and feelings regarding the concept of e-portfolio can leave a deep impact to all stakeholders of e-portfolio. They would shed a light on students' preference of how they would like their e-portfolio classroom to be handled, and this would assist the faculty, administrator, as well as the

teachers to design an appropriate course content to fulfil the needs of the students.

This study may also give some useful insights into the possibility of incorporating the concept of e-portfolio into Malaysian engineering classrooms as a part of graduation requirement.

LITERATURE REVIEW

The dynamic use of e-learning as methods of teaching shows a strong indication that it will definitely continue to grow. This is due to the fact that learners have different needs and many like the flexibility that e-learning has to offer since it presents the recognition that learning occurs beyond the classroom. Consequently, it is no wonder that e-portfolio, as one of the products of e-learning has grown in popularity over the past decades with teachers and students alike.

Many researchers have documented the advantages of e-portfolio instruction, such as its capability to "document growth over time, give students ownership and responsibility for their learning, make learning more collaborative, inform instruction, link assessment to instruction, facilitate lifelong learning, enable independent, self-directed learning, communicate assessment information to parents, faculty officials and institution, increase student motivation to achieve results and reach goals, and also heighten interest in learning," (Bimes-Michalak, 1995: Gilbert, 1993; Wiedmer, 1998). The benefits of e-portfolio engagement can be extended further to other stakeholders. For example, in a study which was performed in Vermont public schools by Aschbacher (1993), regarding the effects of portfolio practices on the educational environment, it was found that teachers involved in assessing work done in a portfolio system believed that this implementation positively influenced their expectations of the students.

The dynamic use of e-portfolio is not restricted only among students and teachers in schools and colleges, but in other areas worthy of it to be visible. A study on the uses of e-portfolio in the working world by Herdlein (2004) noted that portfolios might be used in student affairs graduate programs to display competencies and assess learning outcomes obtained in practical and assistantships. This conforms to Denzine's call (2001) upon all professionals in the student affairs field to recognise the ability of portfolio to motivate ongoing professional growth of members, thus implementing portfolio programs for all staff. Due to these assemblages of advantages and many others, e-portfolio has left a big impact on learning theory and has gained boundless favor nowadays.

E-portfolio systems in higher education initiate from various departments and have many different functions (Ramsden, 2003). Around the globe, especially in developed countries, many college students have used portfolios for many years. We most often hear of students using them in artistic or communications fields (e.g., a portfolio of photographs, drawings, or publications), but they are being used increasingly in other fields as well. Apart from student portfolios, they are also developing faculty portfolios and institutional portfolios (Cambridge et al., 2001). Somehow, the concept of e-portfolio is still fairly new around South East Asia, particularly in Malaysia. Thus, e-portfolio is still uncommonly new in the field of engineering.

Besides developing e-portfolio for the sake of exposure or making it visible for others to view, there are three other general purposes for developing e-portfolio: "Learning, which usually occurs on an ongoing basis supporting professional development;

Assessment, which usually occurs within the context of a formal evaluation process; and Employment, which is used for seeking employment in the industry related to it" (Hartnell-Young & Morriss, 2007; Wolf, 1999). E-portfolio offers a rich picture of students' efforts that can be helpful in assessing their achievements and development within a certain period of time. The participation from the industry such as the technology vendors, and publishers who are currently developing many more brilliant e-portfolio tools and products adds more to the list of those who would benefit from the development of the systems.

Two experimental studies have shown that students who are aware of the learning objectives in addition to assessment criteria and have the opportunities to reflect on their own work show more improvement than those who do not (Frederikson & White, 1997). Consequently, Young (2002) reported that e-portfolio could be the next big thing in campus computing as more and more institutions are "encouraging, even requiring, students to create portfolios to highlight their academic work and reflect upon their campus experiences". Young further noted that e-portfolio may do better by helping students conceptualize how even a discrete activity can be related to the development of their skills throughout their life or career. Thus, the institution can also benefited from all these. E-portfolio as the way it is facilitates the sharing of experiences and communication among students and faculty who are either face-to-face or at a distance (Yancey, 2001).

Not only that e-portfolio draws the interest of many due to the abundance of hard skills it has to offer, but also due to the notion of lifelong learning which comes together with it. According to one of the Malaysian chief ministers, Datuk Seri Musa Aman (Daily Express, Sabah, 26 June 2005), it is a big mistake to think that skills can only be acquired from vocational and technical training centres, as there are more to these. Nevertheless, some consensus in Malaysia today claim that soft skills which clearly promotes lifelong learning will need to be at the centre stage now and in the future, and that it should play a major role as a integral part of the national education and training system with equal importance and status to the general stream education and training. Thus, while the general benefits of e-learning receive much attention among the stakeholders, few studies have focused exclusively on the contribution of e-portfolio in developing soft skills, or particularly deep learning.

Barbara Cambridge of the American Association for Higher Education (2001) has identified the principles of deep learning which are comparable with the characteristics and benefits of e-portfolio implementation: reflective, developmental, integrative, self-directive, and lifelong.All the principles identified here compliment the implementation of e-portfolio as an added tool in classroom instruction as they promote the development of soft skills which are much needed by undergraduates nowadays. Musa (Daily Express, Sabah, 26 June 2005) said some youths failed to be employed immediately upon graduation mainly because they fail to master these soft skills. According to Pallister (2007), "e-portfolio with reflective assessment supports students' goals for learning, works in progress, peer and instructor feedback, and reflections on the work and process. It also promotes continuous improvement for both students and instructors, and clarifies the relationship between course learning and lifelong career development".

Engineering undergraduates usually learn outstanding technical skills, but are often short on vision and the interpersonal skills required to survive in the working world. As a result, they often lack a sophisticated self-image and do not have a sense of how to integrate personal goals with the goals of their future work organization.

Various research on student engagement with learning signify that when students know that they can have their own preference in how to learn a subject matter "they are more engaged to gain more understanding of the subject, and not merely seeking for simple information acquisition subject" (Entwistle, 1998; Ramsden, 2003.) In a research conducted involving 143 medical students at the International Medical University, Malaysia, the finding illustrated that the majority of respondents who were the students of the university felt that the portfolio is a good learning tool (Elango, Jutti, & Lee, 2005),hence research in the same area focusing on local engineering students are still very uncommon to find.

It was a study conducted by Ritzhaupt and Singh (2006) which used Electronic Portfolio Student Perspective Instrument (EPSPI) as their instrument which had triggered to this research. The aim of this study was to find out about engineering undergraduates' general perceptions of e-portfolio as a new concept in learning experience. Additional aims were to understand their feelings towards the idea of embedding the concept of e-portfolio in their classroom instruction, and to find out their attitudes on the elements of soft skills within the concept itself. In the study carried out by the two researchers, the respondents were twenty two students who had applied the concept of e-portfolio in their course for three months. The intention of running the survey that late in a course was for the respondents to be familiar with the concept of e-portfolio and its potential use. The findings showed that the respondents were very positive towards the implementation of the concept in their course, and the evidence of this showed in all the four constructs which shaped the rationale of running the survey; learning, assessment, employment and visibility.

METHODOLOGY

The approach in this study is mainly quantitative and because it was based on another research conducted by Ritzhaupt and Singh (2006), which used the same instrument by the name of EPSPI, any issue on validity of the theoretical framework and the instrument used was groundless.

For the purpose of this study, Likert-style survey questionnaires were used: strongly disagree, disagree, neutral, agree and strongly agree. In order to facilitate the analysis, the five levels of perception in the questionnaire; 'strong agree', 'agree', 'neutral', 'disagree' and 'strongly disagree' were at times regrouped; 'strongly agree' and 'agree' were grouped as one, and 'strongly disagree' and 'disagree' were grouped as the other. However, the perception of 'neutral' stood on its own.

Questionnaire A was designed to find out the students' perceptions and attitudes as they engaged themselves with the concept and creation of e-portfolio for the first time. Questionnaire B tries to reach the objectives of the study. The instrument developed by Ritzhaupt and Singh (2006) was adapted and used. This questionnaire originally consisted of forty questions. The number was reduced to thirty six only to befit the aims of this study. In answering the sixth research question, which is about students' perceptions of whether e-portfolio can help in developing their soft skills, the same questionnaire associated with the four constructs was used. However, only fourteen questions are related to soft skills, but these are enough to present a valid data. The instruments were piloted on a group of first year students in January, 2008. The pilot test revealed that students easily understood the questions and that the instruments were reliable and appropriate for the study.

A total of 58 students from two engineering faculties at UTeM were chosen to participate in this study. The sample represented first and second year students with the years of learning English ranged from eleven to fifteen years. The students in this study were taking the course of 'Technical Communication I', which focused on the skills of job application, and job interview. 77.5% of them were male, and the rest 22.5% were female. Their age ranged from twenty to twenty five years old. The participants were all Malaysians and most of them were Malays.

Students were given an introduction to the concept of e-portfolio and were shown the process of creating their own e-portfolios using Microsoft Word. They were instructed to include some information prepared by them for their Technical Communication course into the e-portfolio, and before the end of the class, the first questionnaire was distributed. In the next meeting which was held a week later the students answered the second questionnaire. The gap of one week was given between the distribution of both questionnaires for the students to socialise more with the concept of e-portfolio, and to give them ample time to reflect on their experience of using the system.

RESULTS AND DISCUSSION

All of 58 students were computer literate and have no problem in accessing to internet connection, on or off campus. They also used computers in their course works all the time. However, only twelve of the students admitted that they came across samples of e-portfolios but none of the fifty eight respondents had any experience of building their own e-portfolios. Somehow, the majority of them were interested to be exposed to the concept.

Results for Questionnaire A

The survey for Questionnaire A was created for students to be able to generally report on their attitudes and impressions of their first experience in experimenting with the process of developing their own portfolios. The results of the survey were extremely positive. None of the students chose to answer 'disagree' or 'strongly disagree' of the Likert-scale. Based on the analysis of the questionnaires, all of the students agreed that their engagement with e-portfolio was overwhelmingly comforting. This could be due to the fact that all of them were computer literates, thus to apply their knowledge on a new concept which they perceived to be beneficial thrilled them most. 14% of them were neutral when asked whether they would be more creative after having produced their own e-portfolio. This could be explained by the short time they had while being introduced to the concept and needed more time to overcome their fear and anxiety.

79% reported that they would prefer to create e-portfolio instead of producing traditional resume when 21% more chose to be neutral. Maybe this is due to the hassle of developing an e-portfolio which they barely knew. Finally, all of the students perceived the process of creating e-portfolio improved the quality of their learning, and would benefit them in the future. This is because they learned something new that would add to their knowledge and promotes deep learning.

Results for Questionnaire B

Students' Perceptions on Learning

Educational technology in a form of an e-portfolio has noticeable effect on students' learning because they are taking more responsibility for their own learning. In the analysis of data, 97% agreed that e-portfolio had helped them in developing their skills on proficiency and knowledge on specific information. 37.9% of them strongly believed that e-portfolio could improve their skills if used continuously and 44.8% were passionately willing to use e-portfolio as a tool to develop their knowledge. On the notion that e-portfolio is able to monitor one's skills and knowledge, 77.5% of the them claimed that they would use e-portfolio for the purpose of supervising the growth of their skills and knowledge over time whereas 4.7% of them refused o do so.

39.6% of the students strongly agreed to use e-portfolio for their skill development, whereas only 27.4% were willing to do so for their knowledge development. 1.7% of them strongly disagreed to this. 96.5% of them affirmed that e-portfolio is a valuable learning tool when it comes to correcting mistakes and 98.2% claimed that viewing their peers' e-portfolios added to their learning experience. Thus, in a way they are saying that the opportunity to view their peers' e-portfolios would give them the benefit of learning from each other's mistakes and to correct them. 93.1% of them felt confident that they would use e-portfolio after graduation but 1.7% disagreed and another 5.1% did not take sides.

Students' Perceptions on Assessment

E-portfolio assessment is designed to promote a deep approach to learning. As an assessment tool, it helps students to understand what they were studying e.g. through the process of relating it to the other students.

87.9% of the students testified that they are comfortable in having e-portfolio as an assessment tool for their assignment. Consequently, 64.6% said they would use it for other courses whereas 14% more disagreed with the ideas. 52.5% of them favoured this alternative assessment as compared to the traditional ones, with 4.8% felt that it is better than a multiple choice test, and another 60.3% claimed that e-portfolio assessment is a way more superior than an essay test. In consequent, it is interesting to see that quite a number of the students disagreed or refused to give their stand to the notion of having e-portfolio replacing the traditional way of assessment, with 58.6% of them chose to stand on the fence. And for the first time, more students disagreed to the idea of having the faculty assessing their knowledge using e-portfolio. The difference between those who agreed and those who disagreed was only a slight distinction with 34.4% agreed and 39.6% disagreed.

94.8% of the students agreed if e-portfolio is to be used as part of a capstone course in the program that they were taking. Likewise, 93.1% of them agreed to have e-portfolio as a graduation requirement.

Students' Perceptions on Employment

It is extremely important that undergraduates acquired sufficient level of job-related skills to enable them to climb the professional ladder within an occupation, and e-portfolio could be a good solution.

97% of the students would not hesitate to use e-portfolio in the process of getting a job. 94% feel comfortable if they are requested to present their e-portfolio by the employer. Accordingly, 89.6% of them said that if they are to become employers, they would request for the applicant's e-portfolio to aid them in the hiring process. Thus, 94.8% of them favoured their resume to be in an e-portfolio form as compared to the traditional paper-based type. 89.6% of the students would continue to employ and improve on their e-portfolios even after graduation. In a way, they looked at e-portfolio as a tool of life long learning. In consequent, 93.1% would use e-portfolio to hunt for a job.

Students' Perceptions on Visibility

There are many benefits for e-portfolio to be freely visible for anyone to see; it allows others to see the owner as an individual who is unique with his own characteristics, needs, and strengths, thus at the same time with barriers to be successful.

Some of the students claimed that they felt uncomfortable to have their e-portfolio visible for everyone to see, especially to strangers (27.5%). 48.2% of them would welcome anyone to visit their website. More students were willing to share their e-portfolio with friends (79.3%), but they were most unwilling to show it to their family members (67.2%). Maybe they felt embarrassed to show off their work to their family but considered that sharing with friends would be better as they can evaluate each other's work and improve on their work (94.8%).

18.9% of the students claimed to be uneasy to have their e-portfolio evaluated by the faculty. The notion of having their work assessed by friends was a good experience, but to be graded by the faculty feared them a little. Anyway, to have their e-portfolio shown to other faculty and even to their potential employer by their teacher did not scare them (87.9%).

Results for Questionnaire on Soft Skills

The goal of assembling an e-portfolio for job acquisition has the additional benefit of providing powerful motivation for students to enrich their performance in soft skills because these skills are much in demand by the industry.

82.5% of the students felt that e-portfolio is a good tool for them to improve their quest for soft skills mastery. 86.5% felt that e-portfolio enabled them to practice lifelong learning, which is the most important element of soft skills. 86.2% of the said e-portfolio promoted teamwork, as they felt comfortable sharing their e-portfolio with their friends, peers, etc. and were willing to learn from their mistakes as they shared their e-portfolio with others. 69.2% of them stated that e-portfolio improved their critical thinking as the process of creating it involved various levels of decision making, creative thinking, and multiple other important skills. Other soft skills detected in the process of developing e-portfolio are; communicative abilities, and leadership qualities.

Discussion of the Findings

The findings showed most of the students perceived that e-portfolio is positively useful as an additional learning tool, which could help them in their personal and professional development. Reason disagreement is because the concept of e-portfolio as a classroom instruction was stressful, taxing, involved a lot of work and this would only add more to their already busy schedule. Although beneficial, they think e-portfolio would add to their workload so they perceived this as a burden on them because it involves an ongoing process.

Most of the students were comfortable of having e-portfolio as part of their course assessment, but a bit skeptical on the idea of having e-portfolio to replace the traditional ways o assessment, such as the multiple choice questions and essay. The nature of e-portfolio assessment is based on subjective insight, which is the opposite of what engineering students are accustomed to. Thus, their response in the concept of assessment was not as positive as in the concept of learning. Consequently, more students felt uneasy to let the faculty to use e-portfolio to assess their knowledge. Thus, the faculty should take note of this and provide effective programmes that can be accepted by all.

Overall most of the students were willing to showcase their e-portfolio for others to see, but there are differences between their willingness to share their e-portfolio with strangers, family members, friends, and peers. Because everything they produced in their e-portfolio must be in English, more of them preferred to share their work with their friends or peers. They felt less embarrassed to make mistakes in English, and they can correct each other's mistakes confidently.

In the current study, although less than a month was given for the students they showed a significant interest towards the concept of e-portfolio. This conforms to the findings made by Ritzhaupt and Singh (2006) although they spent three months engaging the students with the concept. 100% of the students claimed that they enjoyed the process of creating their portfolio, they felt comfortable with the process and they believed that their engagement with the concept of e-portfolio can definitely improve their learning. In the area of assessment and visibility where significant differences in findings can be found could be explained by the difference in the duration of time that the students were exposed to the concept of e-portfolio which affected the data collected.

In the area of students' engagement in soft skills, a significant finding showed the positive effect of e-portfolio in improving students' acquisition of generic skills. Most felt that e-portfolio promotes lifelong learning, teamwork, and improves their critical thinking as the process of creating it involved various levels of decision making, creative thinking, and multiple other important skills.

CONCLUSION

This research was a survey on engineering students' perceptions and attitudes of e-portfolio based on four constructs; employment, learning, assessment, and visibility. The study also focused on the students' feelings on the elements of soft skills embedded in the concept of e-portfolio. The result showed that the findings were extremely positive. Based on the analysis of the questionnaires, all of the students agreed that their engagement with e-portfolio was overwhelmingly comforting and it could improve the quality of their learning. They also claimed that they would not mind sharing their e-portfolio for other people to see. But, their level of confidence would be higher if they were to showcase their e-portfolios to their peers and friends, instead of their family members. Another significant finding showed that although more students were ready to embrace the concept of e-portfolio assessment, when it comes to letting the faculty to use e-portfolio to assess their knowledge, more students claimed to feel uneasy with the idea. Finally, the students were also optimistic that of e-portfolio could improve their acquisition of generic skills.

The implications of the findings may give some useful insights for the stakeholders of e-portfolio on the possibility of bringing technologies into engineering students' classroom; in a form of e-portfolio. However, due to the limited samples and the

brief introduction that they had on the concept of e-portfolio, the findings of this study may not be generalised or applicable to the whole population of engineering students nationwide. Future research should study more students from other technical universities, schools and institutions and focus on their perceptions after a long extended use of the concept. Apart from the four main constructs, more investigation should be made in the area of soft skills as embedded in e-portfolio, for example how can the stakeholders of e-portfolio support a deep, sustainable, self-directed, lifelong learning which are much associated with generic skills? Thus, the research on e-portfolio would definitely be more positive and encouraging. Finally, the findings in this study demonstrate that the possibility of authentically implementing the concept of e-portfolio in Malaysian educational curriculum is indeed appealing.

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