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# **Raising engagement and motivation through gamified e-portfolio: A student perspective**

By

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A thesis submitted in partial fulfillment of the requirements for  
the degree of

**Doctor of Philosophy in Computer Science**

University of Warwick

**Department of Computer Science**

April 2019

## Table of contents

Table of contents .....	i
List of Figures .....	vi
List of Tables .....	ix
Acknowledgement .....	xi
Dedications .....	xiii
Abstract.....	xiv
Declarations .....	xvi
Abbreviations.....	xvii
Chapter 1.....	1
Introduction .....	1
1.1 Research Background.....	1
1.2 Research Motivation.....	5
1.3 Research Problems.....	7
1.4 Research Objectives.....	8
1.5 Research Questions .....	8
1.5.1 Main Research Question.....	9
1.5.2 Sub Research Questions.....	9
1.6 Thesis Outline.....	11
1.7 Chapter Summary .....	13
Chapter 2.....	14
Literature Review.....	14
2.1 Introduction .....	14
2.2 Digital students .....	17
2.3 E-Portfolios.....	19
2.3.1 Definition .....	19
2.3.2 Types of E-Portfolio.....	23
2.3.3 E-Portfolio in Higher Education.....	25
2.3.4 E-Portfolio Framework.....	29
2.3.5 Advantages and disadvantages of e-portfolio .....	33
2.4 Gamification.....	36
2.4.1 Definition .....	36
2.4.2 Gamification in Education.....	40
2.4.3 Gamification Principles .....	43

2.4.4	Concept of Gamification .....	44
2.4.5	Advantages and disadvantages of gamification .....	53
2.5	Student Engagement and Motivation.....	56
2.6	Chapter Summary .....	63
Chapter 3.....		64
Research Methodology.....		64
3.1	Overview of the types of research and research design .....	64
3.2	Methodologies used in this research.....	67
3.3	Quantitative Research Methods .....	73
3.4	Qualitative Research Methods.....	76
3.5	Data Analysis Process.....	76
3.5.1	Quantitative Data Analysis.....	77
3.5.2	Qualitative Analysis Process .....	79
3.6	The MARA ePortfolio (MeP) Software Development Process .....	82
3.6.1	Software Development Methods Review .....	83
3.6.2	MeP Software Development Method.....	88
3.7	Conclusion.....	89
Chapter 4.....		90
Initial Study .....		90
4.1	Introduction .....	90
4.2	About the Pre-Survey.....	91
4.2.1	Aims and Objectives.....	92
4.2.2	Methodology.....	93
4.3	Pre-survey Findings .....	95
4.3.1	Demographics .....	96
4.3.2	Students' Current Styles in Archiving and Organising Their Learning Materials	103
4.3.3	Prior Experiences with E-portfolio Creation and Development .....	108
4.3.4	Prior Experiences in Technology, Games Application, Gamification, and Perceptions Towards Game Elements .....	111
4.4	Discussion.....	112
4.5	Conclusion.....	114
4.6	Limitation .....	115
4.7	Chapter Summary .....	116

Chapter 5.....	117
Theoretical Framework.....	117
5.1 Introduction .....	118
5.2 Gamified e-portfolio framework.....	118
5.3 Chapter Summary .....	123
Chapter 6.....	124
The MARA ePortfolio (MeP) System.....	124
6.1 Introduction .....	124
6.2 The general description of MeP creation and content development .....	125
6.3 The MeP system design process .....	128
6.3.1 Analysis of requirements .....	128
6.3.2 Development of prototype .....	134
6.3.3 User testing and feedback .....	140
6.3.4 Prototype revision or refinement .....	141
6.3.5 Final product release .....	142
6.4 MeP Design and Development Challenges and Limitations .....	142
6.5 Chapter Summary .....	142
Chapter 7.....	144
Student’s Perception of MARA ePortfolio (MeP) .....	144
7.1 Introduction .....	144
7.2 About the Post Survey .....	145
7.2.1 Aims and Objectives.....	146
7.2.2 Methodology.....	146
7.3 Post-survey findings.....	150
7.3.1 Demographics .....	151
7.3.2 Student feedback on the advantages of e-portfolio.....	153
7.3.3 Student opinion on gamified e-portfolios.....	156
7.3.4 Student feedback on the advantages of e-portfolio with “GAMIFIED” elements	165
7.3.5 Current experiences with e-portfolio creation and development.....	167
7.3.6 Statistical analysis .....	170
7.4 Interviews.....	175
7.4.1 Interview Process.....	176
7.4.2 Findings .....	182

7.5	Conclusion.....	188
7.6	Chapter Summary .....	188
Chapter 8.....		190
Warwick Student’s Perception of Gamified e-Portfolio .....		190
8.1	Introduction .....	190
8.2	About Warwick Survey.....	191
8.2.1	Aims and Objectives.....	191
8.2.2	Methodology.....	192
8.3	Warwick Survey Results .....	194
8.3.1	Findings .....	194
8.4	Discussion of the results .....	205
8.5	Conclusion.....	207
8.6	Chapter Summary .....	208
Chapter 9.....		209
Discussion, Contributions, Conclusion, the Recommendations and Future Work.....		209
9.1	Introduction .....	209
9.2	Discussion of the results .....	210
9.3	Research Challenges and Limitations.....	220
9.4	Research Contributions.....	221
9.4.1	The research community .....	221
9.4.2	The lecturers .....	222
9.4.3	The students.....	222
9.4.4	The higher education institutions and universities.....	223
9.5	Research Conclusion .....	223
9.6	Research Recommendation and Future Work.....	223
9.7	Chapter Summary .....	224
References .....		225
Appendix A – Pre-survey.....		239
Appendix B – MeP User Interfaces .....		245
Appendix C – Post-survey .....		252
Appendix D – Interview.....		260
Appendix E – Sample of Interview Transcripts .....		268
Appendix F – Coding of Interview transcripts (sample).....		274

Appendix G – Categories, subcategories and codes for the perceptions of students about gamified e-portfolio (MeP) .....	281
Appendix H – Data coding sheet for content analysis of participant’s background of MeP .	286
Appendix I – Consent Form.....	287
Appendix J – Pilot Test .....	288
Appendix K – Warwick survey participants’ demographic .....	291
Appendix L – Research Timeline .....	294

## List of Figures

Figure 2.1: Understanding how e-portfolios work – Impact of e-portfolios on learning (source: Becta report (2007)).....	21
Figure 2.2: The learning portfolio model .....	30
Figure 2.3: Learner ownership and control of electronic portfolio (Barrett 2005) .....	32
Figure 2.4: Game mechanics vs. human desires (source: Bunchball (2010)) .....	45
Figure 2.5: The Bartles Type (Source: frankaron.com) .....	46
Figure 2.6: Game elements pyramid (Werbach 2012).....	46
Figure 2.7: Game thinking broken down by design goal (Marczewski 2015) .....	51
Figure 2.8: Game thinking (Marczewski 2015) .....	52
Figure 2.9: Game thinking decision trees (Marczewski 2015) .....	53
Figure 2.10: Fogg’s Behaviour Model (Fogg 2009) .....	61
Figure 2.11: Self-determination theory (SDT).....	61
Figure 2.12: The Self-Determination Continuum (Deci and Ryan 2000) .....	63
Figure 3.1: Research Methodologies .....	68
Figure 3.2: Content Analysis .....	81
Figure 3.3: Waterfall model (adapted from Royce (1970)).....	83
Figure 3.4: Spiral model (source from <a href="https://en.wikipedia.org/wiki/Spiral_model">https://en.wikipedia.org/wiki/Spiral_model</a> ) .....	84
Figure 3.5: Prototyping model (adapted from Carr & Verner (1997)) .....	86
Figure 4.1: Gender vs. Course .....	96
Figure 4.2: Frequency using the Internet by course (n=174).....	98
Figure 4.3: Ease of use of computer by course (n=174) .....	99
Figure 4.4: Device used to access the Internet.....	100
Figure 4.5: Internet speed.....	101
Figure 4.6: Summary of computer skills and Internet services information based on gender in percentage (%).....	102
Figure 4.7: Feedback on completed work pie chart .....	107
Figure 4.8: Preferred people to give feedback to student’s artefacts.....	108
Figure 4.9: Frequency of updating portfolio .....	109
Figure 4.10: Preferred e-portfolio item .....	110
Figure 4.11: Preferred e-portfolio features .....	112
Figure 5.1: Conceptual framework of the study .....	117
Figure 5.2: Gamified e-portfolio framework.....	121
Figure 5.3: Adapted framework for gamification (source: Nah et al. (2013)) .....	122
Figure 5.4: Gamified e-portfolio system design.....	122
Figure 6.1: Portfolios dimensions (Cotterill et al. 2004) .....	125
Figure 6.2: The MeP Context Diagram .....	133
Figure 6.3: MeP system sitemap.....	135
Figure 6.4: Adapted pyramid of gamification elements .....	136
Figure 6.5: The gamification design .....	140
Figure 7.1: Internet access evaluation (n=51).....	152
Figure 7.2: Advantages of e-portfolio (n=51).....	154



Figure 7.3: Engagement (n=51).....	157
Figure 7.4: Student opinion on gamified e-portfolio – enjoyment (n=51) .....	158
Figure 7.5: Student opinion on gamified e-portfolio – motivation (n=51) .....	159
Figure 7.6: Motivation (n=51) .....	160
Figure 7.7: Student opinion on gamified e-portfolios – learning (n=51) .....	161
Figure 7.8: Learning (n=51) .....	162
Figure 7.9: Student opinion on gamified e-portfolios – usability (n=51).....	163
Figure 7.10: Usability (n=51) .....	164
Figure 7.11: Student opinion on gamified e-portfolio – collaborations (n=51).....	165
Figure 7.12: MeP’s game elements assessment (n=51). .....	167
Figure 7.13: Student’s prior experience with portfolios and e-portfolios.....	168
Figure 7.14: The frequency of updating portfolio (n=51). .....	168
Figure 7.15: Items should be included in the e-portfolios (n=51). .....	169
Figure 7.16: Internet access evaluation bar chart .....	173
Figure 8.1: Internet reliability .....	195
Figure 8.2: Frequency using the Internet.....	195
Figure 8.3: Internet skills satisfaction .....	196
Figure 8.4: Devices owned by a student. ....	196
Figure 8.5: Confidence using a desktop or a laptop. ....	197
Figure 8.6: Device a student usually used to update their Warwick MyPortfolio. ....	198
Figure 8.7: How long have you been using Warwick MyPortfolio? .....	199
Figure 8.8: Why you are not using Warwick MyPortfolio? .....	199
Figure 8.9: How often do you update your Warwick MyPortfolio?.....	200
Figure 8.10: Which part of Warwick MyPortfolio do you use most? .....	200
Figure 8.11: Do you think Warwick MyPortfolio helps you do your personal development plan (PDP)?.....	201
Figure 8.12: What is your level of understanding of Warwick MyPortfolio features? .....	201
Figure 8.13: How easy was Warwick MyPortfolio to you? .....	202
Figure 8.14: Preferred features student want to include in Warwick MyPortfolio.....	202
Figure 8.15: Rate how do you think of the game elements if included in Warwick MyPortfolio? .....	204
Figure 8.16: Student’s perceptions of the game elements.....	205
Figure B.0.1: Home page top .....	245
Figure B.0.2: Home page middle.....	245
Figure B.0.3: Menu before login .....	246
Figure B.0.4: Menu after login .....	246
Figure B.0.5: Home page for member with leaderboard (B) and achievements (A) .....	246
Figure B.0.6: Notification features (C) .....	246
Figure B.0.7: Sample of submenu .....	247
Figure B.0.8: Sample personal portfolio .....	247
Figure B.0.9: Sample of available badges to collect.....	248
Figure B.0.10: Leaderboard page .....	248
Figure B.0.11: Rank page .....	249
Figure B.0.12: Profile page with user profile progression bar (E).....	249
Figure B.0.13: Sample user achievement in user profile page .....	250

Figure B.0.14: Sample user history in profile page .....	250
Figure B.0.15: Document creation page .....	251
Figure B.0.16: Settings features for document creation .....	251

## List of Tables

Table 2.1: LMS vs E-Portfolio .....	17
Table 2.2: Digital immigrants vs. digital natives (source: Unplag.com) .....	18
Table 2.3: Electronic Portfolio Definitions .....	22
Table 2.4: Game, game-based learning, and gamification comparison (source from www.upsidelearning.com).....	39
Table 2.5: Game elements (adapted from Bunchball (2010)) .....	45
Table 2.6: The reward categories (adapted from (Burke 2011)) .....	47
Table 2.7: Primary elements in implementing game mechanics (adapted from Zichermann and Cunningham (2011)) .....	48
Table 2.8: Design elements for gamification (adapted from Kankanhalli et al. (2012)).....	48
Table 3.1: Mapping of research questions to data collection activities .....	70
Table 3.2: Warwick students vs KPM students .....	72
Table 3.3: Calculation of representative sample size for pre-survey, post-survey and Warwick mini survey.....	75
Table 3.4: Calculation of sample size margin of error for pre-survey, post-survey and Warwick mini survey.....	76
Table 3.5: Advantages and disadvantages of waterfall model .....	84
Table 3.6: Advantages and disadvantages of spiral model.....	85
Table 3.7: Advantages and disadvantages of prototype model .....	87
Table 3.8: Comparison of the models.....	88
Table 4.1: Internet usage duration, frequency, and Internet skills satisfaction.....	97
Table 4.2: Location accessing the Internet .....	100
Table 4.3: Who pays for the Internet access? .....	101
Table 4.4: Internet service restrictions versus connection speed .....	102
Table 4.5: Course (Kursus) versus Keep artefacts.....	103
Table 4.6: Course (Kursus) versus Keep artefacts in a file .....	104
Table 4.7: Students' responses in referring to their previous work and keeping their learning materials .....	104
Table 4.8: Course (Kursus) versus Artefacts gone missing .....	105
Table 4.9: Students sharing preference of their learning materials .....	105
Table 4.10: Students' prior knowledge and experience of e-portfolios .....	108
Table 4.11: Students' perceptions and prior experiences of Internet, computers, computer games, gamification, and gamification in education .....	111
Table 6.1: The game components of MeP .....	135
Table 6.2: Ranks .....	138
Table 6.3: Mapping of MeP activities with the game components .....	139
Table 7.1: Reliability test for the study .....	149
Table 7.2: Participants' demography .....	151
Table 7.3: Case Processing Summary.....	170
Table 7.4: Internet access evaluation - Do you have a problem accessing the Internet vs Usability - I found the gamified e-portfolio very cumbersome to use .....	171
Table 7.5: Chi-Square Tests.....	171

Table 7.6: Symmetric Measures.....	172
Table 7.7: Variables not in the equation.....	174
Table 7.8: Mapping of research questions with higher order themes of the interview data content analysis .....	178
Table 7.9: Themes/categories general description.....	179
Table 8.1: Internet access evaluation .....	194
Table 8.2: Warwick MyPortfolio experiences.....	198

## **Acknowledgement**

First of all, I would like to thank Allah the Almighty for everything in my life and for giving me the courage and strength to be able to finish my PhD journey. Next, I would like to take this opportunity to thank all who have supported me during my study. Very special thanks to my supervisor, Dr. Mike Joy for his support, supervision, advice and encouragement from the moment I started my study to the end of my PhD journey. You were always there for me when I needed advice and encouragement. It was your consistent academic guidance and motivation that kept me going. Thank you for being patience and for believing in me, I am truly grateful to have you as my supervisor. In addition to that, I would like to thank my advisors and co-advisor, Dr. Steve Mathews, and Dr. Sara Kalvala who gave valuable feedback and suggestions for this thesis. Thank you to the staff of Computer Science Department at Warwick, especially to Sharon Howard and Roger Packwood who always help me when I need it. Thank you to the examiners Dr. Alexandra Cristea and Dr. Lindsay Marshall, who are willing to attend the viva session and evaluate my thesis. I would also like to extend my gratitude to Majlis Amanah Rakyat (MARA) for sponsoring me and to the staff and students of Kolej Profesional MARA Indera Mahkota, Kolej Profesional MARA Beranang, Malaysia, and University of Warwick, UK, who have contributed tremendously in my research activities. To my good friends in the Education Technology lab, my friends at the REX in the library, the REX staff team, my friends in Malaysia Coventry Society (MCS) and Warwick Malaysian Students Association (MSA), thank you all for your continuous support and help. To my mother, Ramlah Abdul Rahman, this is for you 'Mak'. I hope, I have made you

proud. No words can ever describe your soothing and calm words that motivate me throughout my PhD journey. To my husband Nik Mohd Ramli bin Nik Husin, you have sacrificed a lot for me, and you went through this journey with me, thank you for being my pillar of strength. I love you. To my children Adli and Danish, thank you for being so understanding, adorable and helpful companion. You make this journey less lonely and much more interesting. Thank you to my parents in law, for giving me space and encouragement to finish my study. To my grandmother and to all my family members, Dr. Zurina, Nurbani, Mohd Izuan, and Mohd Afif who stood by me through this journey, thank you for always being there when I needed you. Thank you.

## Dedications

I would like to dedicate this research to my late father, **Abdul Wahab bin Kasim**. You are the reason why I pursue my education to the highest level. This research is also dedicated to my late grandfather, **Abdul Rahman bin Md. Isa**, who had just passed away during my final year of study due to cancer. Special dedications to my husband, my children and my mother for their patience and support which helped me went through this journey.

## Abstract

Is it possible to make people use the e-portfolio just for fun? This was the question post by the researcher which include an e-portfolio system with the functions of giving a point to any task or activity done, giving a point and a badge to a series of tasks done and the accumulated points will contribute to their position in the leaderboard in the e-portfolio system. This is what we call 'Gamification', which is the concept of applying game elements in a non-game context to inspire positive change in others. In education, the gamification of e-learning to make it fun and engaging by using game mechanics to encourage learners to explore and learn as they move toward the goal has been trending. This is to overcome the key issue in e-learning in generating enough motivation so that students will want to invest the time and effort required to learn but not enough empirical research has been done on the gamification of the e-portfolio, an electronic collection of evidence that shows learner's learning journey over time.

This thesis investigates the gamification approach to the e-portfolio system at Kolej Profesional MARA (KPM) in Malaysia. An initial study revealed that no visible constraints for the students regarding their institution's infrastructure to implement an e-portfolio system, the students' Internet and computer skills were in an acceptable level, the students have appropriate devices to access the Internet, and their current Internet services were also in an acceptable condition. For e-portfolio content preferences, the profile page is the most preferred content while other items have the same level of importance to students. The preferred game-like features by the students to be included in the e-portfolios are points followed by feedback, status, and levels. This research then presents the theoretical underpinnings of the research and discusses related theories and models relevant to the research in developing the proposed theoretical framework for the gamified e-portfolios that include these four dimensions: e-portfolio dimension, gamification dimension, engagement dimension, and motivation dimension. From the gamified e-portfolio framework, the design, development and implementation activities of the gamified e-portfolios have been done followed by the evaluation of the



gamified e-portfolio system. The major technological delivery suggested by this thesis was the prototype, implemented as a web application of the gamified e-portfolio system. The major research achievement was evaluating participants' perception of the gamified e-portfolio system. The evaluation of the gamified e-portfolio shows a positive indication of the gamification approach. The chosen game elements were indeed considered to make activities in the e-portfolio more engaging and fun. The results presented in this thesis are based on the students' perceptions of the MARA ePortfolio (MeP) system (the gamified e-portfolio system).

## Declarations

This research has been written by myself and presents work that I have done except where otherwise stated. The thesis has not been submitted to any other university for degree purposes. Parts of the thesis were published as follows:

1. Chapter 4 presents the preliminary survey (pre-survey) findings of raising engagement and motivation through gamified e-portfolio in Kolej Profesional MARA (KPM), Malaysia. This paper was published in the eLEOT Conference Proceedings by Springer-Verlag in the Lecture Notes of ICST (LNICST). The paper is available both in book form and via the SpringerLink digital library as follows:

Abdul Wahab, M. and Joy, M. 2016. Raising Engagement and Motivation Through Gamified e-Portfolio in Kolej Profesional MARA (KPM), Malaysia: A Preliminary Survey. In: Vincenti, G. et al. eds. E-Learning, E-Education, and Online Training. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, vol 180. E-Learning. Springer, Cham, pp. 87–94. Available at: [https://link.springer.com/chapter/10.1007/978-3-319-49625-2\\_11](https://link.springer.com/chapter/10.1007/978-3-319-49625-2_11).

The proceedings are also submitted for inclusion to the leading indexing services: DBLP, Google Scholar, Thomson Scientific ISI Proceedings, Elsevier Engineering Index, CrossRef, Scopus, as well as ICST's own EU Digital Library (EUDL).

## Abbreviations

CD-ROM	Compact disc – read only memory
DEC	Diploma in English Communication
DVD	Digital versatile disc or digital video disc
GMI	German-Malaysian Institute
HEI	Higher Education Institution
HND SD	Higher National Diploma in Software Development
HND SYD	Higher National Diploma in System Development
ICT	Information and communication technology
IPM	Institut Perdagangan MARA
KM	Kolej MARA
KPM	Kolej Profesional MARA
KPMAM	Kolej Profesional MARA, Ayer Molek
KPMB	Kolej Profesional MARA, Beranang
KPMBM	Kolej Profesional MARA, Bandar Melaka
KPMBP	Kolej Profesional MARA, Bandar Penawar
KPMIM	Kolej Profesional MARA, Indera Mahkota
KPMSI	Kolej Profesional MARA, Seri Iskandar
KPTM	Kolej Poly-Tech MARA
LMS	Learning management system
MARA	Majlis Amanah Rakyat

MDA	Mechanics, dynamics, aesthetics
MeP	MARA ePortfolio System
MP3	Motion Pictures Expert Group (MPEG) Audio Layer III – a file extension and compression method that utilizes the MPEG standard to reduce the size, often by a factor of 12, while still maintaining CD-like quality
PBL	Points, badges, and leaderboards
PC	Personal computer
PDA	Personal digital assistant
RAMP	Relatedness, autonomy, mastery, purpose
REGO	Research Ethics & Governance Office
SPM	Sijil Pelajaran Malaysia
TVET	Technical and vocational education and training
UNESCO	United Nations Organisation for Education, Science and Culture

# Chapter 1

## Introduction

This chapter will present the research background, motivation, research problem, and research objectives of the thesis. It will also list down the research questions drawn from the discussion in the research motivation section. This chapter will also outline each chapter in this thesis that would answer the listed research questions.

### 1.1 Research Background

In early days, portfolios were used by artists and designers to collect and display their work. Since then, the uses of portfolios were not limited to only the artists and designers but have been widely used by educators to provide evidence of learning and development. A portfolio, electronic or paper, is simply an organised collection of completed work (Batson 2002). There are portfolios that centre around learning, assessment, employment, marketing, and showcasing the best work (Barrett 2007).

Barrett (2010) defines an e-portfolio as an electronic collection of evidence that shows your learning journey over time. Although e-portfolio gives significant benefits as an emerging technology solution for assessing student achievement and showcasing learning evidence, problems of user engagement in e-portfolio have been reported worldwide.

Majlis Amanah Rakyat (MARA), or the Council of Trust for the People is a Malaysian government agency. It is an autonomous body under the purview of the Ministry of Rural and Regional Development in Malaysia. The Council is responsible for developing, encouraging, facilitating and fostering the economic and social development in the federation, particularly in rural areas. MARA can be divided into four main sectors: Entrepreneurship, Education, Management Services, and Investment.

The MARA education sector can be divided into four divisions: Higher Education Division, Secondary Education Division, Vocational and Technical Division, and Education Sponsorship Division. Higher Education Division (HED) is one of the MARA education sectors responsible for controlling, planning and supervising the activities carried out in UniKL, a university operated by MARA, and also for vocational and professional colleges operated by MARA such as Kolej MARA (KM), Kolej Poly-Tech MARA (KPTM), Kolej Profesional MARA (KPM), and German-Malaysian Institute (GMI). The 'vocational and professional' or 'technical and vocational education and training (TVET)' colleges give a second lane of higher education to students who are unable to continue their studies in universities.

According to the United Nations Organisation for Education, Science and Culture (UNESCO), TVET has been called many names over the years – apprenticeship training, vocational education, technical education, technical-vocational education, occupational education, vocational education and training, professional and vocational education, career and technical education, workforce education, workplace education, and others. TVET includes formal, non-formal and informal learning that prepare young people with the knowledge and skills required in the world of work. As defined by UNESCO, TVET is “the study of technologies and related sciences as well as the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economics and social life”.

TVET programmes in Malaysia are offered at certificate, diploma, and degree levels by seven ministries that include Ministry of Higher Education (MOHE), Malaysia. To be a high-income country and developed economy by 2020, Malaysia has initiated diverse strategies to achieve its objective. The provision and preparation of highly skilled human capital is one of the keystones of the aspiration. There will be an increase in demand for additional 1.3 million TVET workers by 2020 in the 12 National Key Economic Areas (NKEA) identified under the government's Economic Transformation (ETP) based on MOHE's Malaysia Education Blueprint (Higher Education).

This study will be focusing on Kolej Profesional MARA (KPM). KPM or previously known as Institut Perdagangan MARA (IPM) has been established since May 1977. From only a single campus in Kuala Lumpur, now KPM has six campuses in Peninsular Malaysia at Beranang (KPMB), Bandar Melaka (KPMBM), Indera Mahkota (KPMIM), Seri Iskandar (KPMSI), Bandar Penawar (KPMBP), and Ayer Molek (KPMAM). Each of the colleges offers a range of courses from preparatory level to higher national diploma level.

KPM accepts students with ages between 17 and 30 years with a very minimal entry requirement. The entry requirements for all KPMs are the same and as follows: the applicant must be a Malaysian citizen who poses a minimum of three credits for subjects taken in Sijil Pelajaran Malaysia (SPM) including Bahasa Melayu (BM)/ Malay Language, Mathematics and English. The SPM, or the Malaysian Certificate of Education, is a national examination taken by all fifth-form secondary school students in Malaysia. It is the equivalent to the General Certificate of Secondary Education (GCSE) in England, Wales and Northern Ireland; Nationals 4/5 in Scotland; and GCE Ordinary Level in the Commonwealth of Nations. It is the leaving examination of the eleventh grade of schooling. SPM is the examination sat by secondary school students before entry into sixth form or technical education and is set and examined by the Malaysian Examination Syndicate (*Lembaga Peperiksaan Malaysia*).

Therefore, KPM is currently populated with young adults aged 17-26 who have a very minimum academic background which falls into generation Z, a category which is known as digital natives who were born with PCs, mobile phones, gaming devices, MP3 players and the Internet. There are a number of terms to describe the young people currently studying at school, college and university including the digital natives, the net generation, the Google generation or the millennials (Helsper and Eynon, 2010). These terms are being used to highlight the significance and importance of new technologies within the lives of young people (Gibbons, 2007). In this study, KPM students is referred to as digital natives. Digital natives are the

“native speakers” of the digital language of computers, video games and the Internet (Prensky, 2001). They are the generation who were born roughly between 1980 and 1994 and previously has been characterised as the ‘Net generation’ (Tapscott, 1998) because of their familiarity with and dependence on information and communication technology (ICT). The report from the Joint Information Systems Committee (JISC-Ipsos MORI 2008) on a first year students aged 17-19 accepted the argument that “students are ‘digital natives’ – having grown up with ICT and expect to use their own equipment at university”.

Other than that, most of the students in KPM were from B40 income group. Malaysians are categorised into three different income groups: Top 20% (T20), Middle 40% (M40), and Bottom 40% (B40). I refer to the latest definition for T20, M40 and B40 based on the findings from the Department of Statistics Malaysia in October 2017 (Department of Statistics Malaysia 2017). To be in the T20 group, a household needs to earn at least RM13,148 while M40 and B40 groups have moved their bars up to RM6,275 and RM3,000 respectively. All KPMs have about 80% of the B40 income group of students. They are from the low-income group because MARA HEI gives priority to the B40 group. MARA believe, if these group of students were given the opportunity to learn in a more conducive environment with financial support, they can be successful. Helping students from the B40 category that have average results in SPM is inline with MARA vision and mission, to be an outstanding organisation of trust, upholding the nation's pride spearheading the fields of entrepreneurship, education and investment to enhance equity holding of Bumiputera (Malays and other indigenous Malaysian).

KPM is currently interested in implementing e-portfolios. However, user engagement issues in e-portfolio implementation make KPM decision makers to hesitate. Continuous user engagement is important to ensure the success of its implementation.

Computer games, on the other hand, have long been known for their success in modelling behaviour and engaging users. Despite the disadvantages of using computer games in the classroom (Bakar et al. 2006), players, however, seem to like



the game-based approach to learning and find it motivating and engaging (Connolly et al. 2012).

With user engagement issues in e-portfolios and the success stories of user engagement in computer games, educators and researchers are still trying to explore ways to engage users by trying to integrate game elements in education and learning. 'Gamification' has emerged as a new approach to engage users in a non-gaming context (Deterding et al. 2011). Gamification is the use of game mechanics and game design techniques, such as the awarding of points, rewards or other incentives, in non-game contexts, in order to change behaviour (Domínguez et al. 2013). Muntean made a theoretical analysis of gamification as a tool to increase engagement in e-learning platforms (Muntean 2011). However, the integration of game mechanics in e-learning needs to be further explored. This study would like to explore the outcome of integrating game-like features in e-portfolios towards user engagement.

## **1.2 Research Motivation**

The overarching question in this section is 'How can we encourage student or learner motivation and engagement in developing their portfolio?' Some educational institutions have been very successful in implementing electronic portfolios while others have run into problems.

Some of the problems or issues that before and during the implementation of the e-portfolio system:

- a. Attitudes and user acceptance issues – users need time to familiarize with the system and there will be confrontation from users with poor IT knowledge and computer skills, low self-esteem, low level of creativity and innovation that will depend on others (Mat Som et al., 2015).
- b. System design – the system design should meet various user need and competency which make it difficult to satisfy. Poor system design may disengage

users from using it (George Lorenzo and Ittelson, 2005; Mat Som et al., 2015; Hanum et al., 2016).

- c. Management issues – support from management and administration is of the utmost importance (George Lorenzo and Ittelson, 2005; Mat Som et al., 2015).
- d. Technical support – assistance from the technical support team is essential to help users when they need it. Other than that, user manual and online assistance should be made available (Mat Som et al., 2015).
- e. Implementation cost – the cost to implement such system will hinder some of the institutions from implementing the e-portfolio system (Mat Som et al., 2015).
- f. Duplicate media – there are still need for the paper versions of the learning materials to be available especially for accreditation agencies and evaluation teams (Mat Som et al., 2015; Hanum et al., 2016).
- g. Plagiarism – there are also possibilities of plagiarism issues as the materials can be shared (Hanum et al., 2016).
- h. Storage or server problem – institution need to think about the storage capacity of the e-portfolio and ensure that the e-portfolio system is up and running 24/7 (Hanum et al., 2016).
- i. Students did not upload their learning material – e-portfolio is own and develop by the students. If the student did not upload their learning materials, there is no point of having an e-portfolio system (Hanum et al., 2016).

Several success factors that have been discovered through previous research outcomes are:

- a. The need to train students and teachers to work with e-Portfolios (Attwell 1997; Hilzensauer and Buchberger 2009)
- b. Meeting institutional needs and intentions (Wilhelm et al. 2006; Reese and Levy 2009; Zubizarreta 2009)
- c. Helping institutions to prepare for e-portfolio adoption (Barrett 2007)

- d. Facilitating students and teachers engagement with e-Portfolio (McAllister et al. 2008)

This research has been focusing on facilitating students' engagement with e-portfolio application. The use of appropriate approach for user engagement as the basis of the e-portfolio development for vocational and professional institutions like KPM will lead to the successful implementation of the MARA e-Portfolio (MeP) in one of the KPM campuses and hopefully can be replicated in other vocational and professional institutions.

### **1.3 Research Problems**

The implementation of e-portfolios in teaching and learning activity has attracted great interest from the practitioners in the higher education institution (HEI) globally and in developing countries like Malaysia. There are significant benefits of e-portfolios in education. However, there are also identified user engagement issues in using the electronic portfolio systems. The user seemed to use the application initially but did not develop it accordingly throughout their learning duration and after graduating from the education institution.

Existing learning and assessment approaches in MARA vocational and professional colleges consider learning and assessment as a different process while the two complement each other. E-portfolio is an alternative form of learning and assessment that includes the assessment of active learning and performance rather than only recalls memorised facts. Gamification has been successfully used in many web-based businesses to increase user engagement, but a very limited research has been done to explore the idea of integrating gamification elements in e-learning application in general and in the e-portfolio systems specifically as a tool to increase student motivation and engagement. Hence, I have conducted an initial study of user perception towards e-portfolio and game elements in one of the MARA vocational and professional colleges, which is Kolej Profesional MARA (KPM) Indera Mahkota in Malaysia in order to get some ideas on the students' opinion of e-

portfolio and gamification. The collected results from this study have been analysed and used to produce the gamified e-portfolio model to further explore the outcomes. The gamified and social elements were integrated into the student-based e-portfolio system based on KPMIM users' preferences. Later, the gamified e-portfolio prototype was implemented in the web application framework and tested by the KPMIM users. The major technological delivery of this project is a prototype of gamified e-portfolio. I hope the result of this study will help the research community to understand the internal affordances of the game elements and social elements in e-learning applications such as the e-portfolios system.

#### **1.4 Research Objectives**

This research aims to:

1. identify users' perceptions of e-portfolios and gamification,
2. acquire users' e-portfolio requirements and preferences of suitable game elements for the e-portfolio system,
3. design and develop a gamified e-portfolio based on the users' requirements and preferences of the e-portfolio features,
4. evaluate the gamified e-portfolio through student perspective,
5. acquire users' perception of the social elements in the gamified e-portfolio.

#### **1.5 Research Questions**

This research explores the results of gamified e-portfolio towards users' engagement and motivation in MARA vocational and professional institutions. The results will give insights that might be elaborated on in future research. In that respect, there are some research questions that need to be answered.

### **1.5.1 Main Research Question**

#### Research question 0:

*Can we improve user motivation and engagement in an e-portfolio system by applying game elements?*

In order to answer the main research question stated earlier, several sub-research questions have been derived and need to be answered as well.

### **1.5.2 Sub Research Questions**

Research question 1: *Do the current infrastructure and facilities support the use of an e-portfolio system in the institution?*

RQ 1.1 Do students have access to the Internet?

RQ 1.2 Do students have suitable devices to connect to the Internet?

RQ 1.3 Do students have acceptable internet skills?

RQ 1.4 Do students have acceptable computer skills?

RQ 1.5 Are the Internet services used by the students satisfactory?

RQ 1.6 How frequently do the students use the Internet?

Research question 2: *What is suitable game mechanics for an e-portfolio system?*

RQ 2.1 What type of game elements do students prefer?

Research question 3: *How usable and useful will students find the game elements in the e-portfolio system?*

RQ 3.1 Do points, badges, and leaderboard make users want to update their e-portfolio content?

RQ 3.2 Do points, badges, and leaderboard improve user visits to the e-portfolio system?

RQ 3.3 Do points, badges, and leaderboard increase the frequency of users updating their e-portfolio?

RQ 3.4 Do points, badges, and leaderboard encourage users to share more artefacts in their e-portfolio?

RQ 3.5 Do points, badges, and leaderboard encourage users to give more feedback to others' artefacts in an e-portfolio system?

Research question 4: *How can the implemented game mechanics (points, badges, leaderboard) increase user intrinsic values?*

RQ 4.1 Do points, badges, and leaderboard make users feel a sense of satisfaction?

RQ 4.2 Do points, badges, and leaderboard make users feel a sense of achievement?

RQ 4.3 Does getting a reward (points, badges) after completing a task/activity motivate a user to update their e-portfolio content?

RQ 4.4 Does getting a reward (points/badges) after completing a task/activity encourage a user to participate/ interact more with an e-portfolio system?

Research question 5: *Do the social elements (blog, groups and forum) encourage users to connect and collaborate with each other?*

Research question 6: *Do users feel that they have control of their e-portfolio?*

## **1.6 Thesis Outline**

This thesis has been arranged into several individual chapters to make it easy to understand and refers to. Below is the chapters' outline:

### **Chapter 2: Literature Review**

In chapter 2, I present the summary of literature review related to the research topics.

### **Chapter 3: Methodology**

In chapter 3, I discussed the research methodology used in this study including the quantitative and qualitative methods.

### **Chapter 4: Initial Study (Pre-Survey)**

In chapter 4, I present the initial study to identify the student readiness on the use of e-portfolios. Aspect studied were demographics, students' style in keeping and organising their learning materials or evidence, students' prior experiences with portfolio creation and development, students' prior experiences in using technology, games application and gamification concept, and students' initial perceptions towards integrating game elements in e-portfolio application. The results from this study contribute to chapter 5, design and development of the gamified e-portfolio application.

## **Chapter 5: Theoretical Framework**

Chapter 5 presents the discussion of the theoretical framework that form the basis of the gamified e-portfolio system.

## **Chapter 6: The MARA ePortfolio System (MeP)**

Chapter 6 presents the design and development of the gamified e-portfolio system which is called the MARA ePortfolio System (MeP). It was based on the previous chapter discussion and selection of theories.

## **Chapter 7: Student's Perceptions of MARA ePortfolio System (MeP)**

Chapter 7 presents the implementation and evaluation of the gamified e-portfolio in KPM. The evaluation is based on the results of the post-survey (online and interview) and the web analytics data of MeP.

## **Chapter 8: Warwick Student Perceptions of Gamified ePortfolio**

Chapter 8 discussed the results of Warwick survey of the student perceptions of gamified e-portfolio. This mini-study provides a slightly different insight from the initial study (pre-survey) that has been done in KPM due to the participants in Warwick having an e-portfolio application services in place while the KPM students have none.

## **Chapter 9: Discussion, Contributions, Conclusion, the Recommendations and Future Work**

I present a detail discussion of the research findings and how the findings support the research questions posted earlier in the study. This chapter also delivers the contributions, conclusion, recommendations and the ideas for future work.



## **1.7 Chapter Summary**

This chapter has presented the research background, motivation, research problems, research objectives, and derived research questions. It also maps out how the chapters answer the research questions and give the overview of the thesis structure. The next chapter presents the literature review related to the study.

## Chapter 2

### Literature Review

This chapter provides the literature survey for investigating the gamification of e-learning and e-portfolios and user engagement. It defines and limits the problem that the researcher is working on, relates the findings to previous knowledge, and suggests further research. In this chapter, I hope that I can position my work based on previous research work in the same area. I started my discussion on e-learning in general, followed by discussion on e-portfolios. Next, I discuss about gamification, student engagement and motivation and game thinking. These discussions will form a basic understanding of the research work that I present throughout the thesis.

#### 2.1 Introduction

The implementation of technology in teaching and learning activity has attracted great interest from the practitioners in the higher education institutions (HEI) globally and in developing countries like Malaysia. Many HEIs have started to adopt and implement information and communication technology (ICT) solutions to their problems. Due to the rapid growth of Internet technologies and mobile devices, e-learning has become an increasingly popular learning approach in HEIs. Govindasamy (2002) stated that e-learning includes instruction delivered via electronic media such as the internet, intranets, extranets, and hypertext/hypermedia documents to solve authentic learning and performance problems. A more simple definition of e-learning given by Oye et al. (2012), is that e-learning is the use of ICT to enhance and facilitate teaching and learning in order to provide better access to the information over the network. E-learning also can be considered as a source for flexible teaching and learning processes either in the classroom or outside the classroom (Garrett et al. 2005; Isa et al. 2008; Azizan 2010). Despite some debate about the exact definition of e-learning, it is generally accepted as a learning content offered in various formats (text, video images,

audios, etc.), and it is delivered electronically via the internet using a personal computer, personal digital assistant (PDA) or CD-ROM (Sandars and Langlois 2005).

E-learning has many benefits as listed in the following.

- E-learning is lower cost, its content is more timely and dependable, it is a timely approach for learning, e-learning builds universal communities, and it provides an increasingly valuable learner service (Liaw et al. 2007; Rosenberg 2001).
- E-learning has the availability of up-to-date information, the speed and ease of access to a wide range of resources, and the opportunity for the learner to work at their own pace (Sandars & Langlois 2005).
- E-learning is less expensive to deliver, it is self-paced (courses can be taken when necessary), it is faster (learners can skip material they already know), it provides consistent content, it works from anywhere and anytime, it can be updated easily and quickly, it can lead to an increased retention and a stronger grasp on the subject, and can be easily managed for large groups of students (Cantoni et al. 2004).

There are several types of systems that have been developed to facilitate e-learning activities such as Learning Management Systems (LMSs) and, currently, e-portfolio systems. Our research will focus on the latter.

LMS is one approach to the application of computers to education. It is the infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those goals, and collects and presents data for supervising the learning process of an organization as a whole (Szabo and Flesher, 2002). The following are the general characteristics of LMS in education presented by Bailey (1993):

- Instructional objectives are tied to individual lessons.
- Lessons are incorporated into the standardized curriculum.

- Courseware extends several grade levels in a consistent manner.
- A management system collects the results of student performance.
- Lessons are provided based on the individual student's learning progress.

Higher education around the world has been using LMS to support and improve learning within their institution. However, the OECD (2005) report on "E-learning in Tertiary Education: Where do we stand?" indicates that universities primarily use LMS for administrative purposes, and that LMS so far have had a limited impact on pedagogy. Based on Sclater (2008), the shortcomings of LMS are:

- The communication features of LMSs are poorly utilized in most institutions.
- The LMSs being used primarily as storage facilities for lecture notes and PowerPoint presentations.
- LMSs tend to restrict students to content designed for a particular course and to interactions solely with participants in that course.

These shortcomings of LMSs may however due to institutions' lack of understanding about how to facilitate learning with them together with the inadequacies of the systems themselves. Nowadays, most learners entering higher education have experience of the online world and competence in using social software for leisure or professional activities. Therefore, there's a need for the higher education computing service departments to provide a system with social tools such as wikis, weblog, social bookmark and so on.

E-portfolio on the other hand, offers a more flexible approach and student-centered style of learning. It is an online collection of reflections and digital artefacts and users can use it to demonstrate their learning and development over time to various audiences. It is an environment to facilitate and record personalized, life long, reflective and evidential learning. Below is the comparison of LMS and e-portfolio (Table 2.1) as presented by Penny Leach at the MoodleMoot Barcelona 2008 on 23 October:

Table 2.1: LMS vs E-Portfolio

<b>LMS</b>	<b>E-Portfolio</b>
Courses are the central hubs	Users are the central hubs
Teachers make the rules	Users define their rules
Courses provide structure	Unstructured and organic
Grades are given and managed	Grades not given
Content is available to all on a course	Others can only see what users let them see
Social networking revolves around courses	Users determine their own social networking
Formal	Informal
Classroom	Playground/Pub

This research will focus on e-portfolio system and more discussion will be discussed in a later section.

## 2.2 Digital students

In an increasingly connected and digital world, the way students learn and the things that students know are changing. Prensky (2001) recognised the change and describes students as a new generation of young people going through school with completely different attitudes and ways of processing knowledge than before. This generation is said to be wired for multitasking, high-speed in action, and continuously connected. They are called “digital natives” – a digital native is a person who was born during or after the general introduction of digital technologies, who has been interacting with digital technology from an early age and is comfortable using it. Prensky (2001) defines and applies the term “digital native” to a group of students enrolling in educational institutions who have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and other toys and tools of the digital age. In the

current education environment, these digital natives are now students in higher education and taught by adults who are known as the “digital immigrants” – a digital immigrant is an individual who was born before the existence of digital technology, has become fascinated by it and has adopted it at some point later in life (Prensky 2001). These two generations attract my attention because they are the ones who form communities in higher education institutions. Learning about them and trying to understand their similarities and differences regarding how they perceive, become fascinated by, use, apply and adopt the technology, will benefit HEIs by enabling them to design, develop and provide the best learning environment for the community. Table 2.2 lists the significant differences between the digital natives and digital immigrant generations.

*Table 2.2: Digital immigrants vs. digital natives (source: Unplag.com)*

<b>Digital immigrants</b>	<b>Digital natives</b>
Adopt web technologies	Born during or after the digital age
Prefer to talk in person	Always on, attached to a phone or other device
Logical learners	Intuitive learners
Focus on one time at a time	Multitask and rapidly task-switch
Prefer to have an interaction with one or few people rather than many	Extremely social
Get information from traditional news sites	Multimedia oriented

With the knowledge of digital natives (students) and digital immigrants (teachers) who now form the population of higher education institutions in mind and are currently the users of e-portfolio applications, finding solutions to the question of how e-portfolios will support these new technology-driven generations is vital. Our research will focus more on the digital natives’ perceptions on gamification of e-learning.

## 2.3 E-Portfolios

It is crucial to have a clear understanding of the terms used in this research to avoid misunderstanding and conflicting conception in the discussion. The terms *portfolio* and *e-portfolio* are used interchangeably in my discussion throughout the thesis. Thus, the meaning of these terms needs to be clarified to best match what the researcher means by it. This section discusses about e-portfolio in detail.

### 2.3.1 Definition

*What is a portfolio?*

In early days, portfolios were used by artists and designers to collect and display their work. Since then, the use of portfolios has not been limited only to artists and designers but has been widely used by educators. The term “portfolio” gives a variety of meanings to people. Portfolios have been used across a variety of fields to provide evidence of learning and development. A portfolio can be viewed as a collection of materials (in any form like documents, images and writings) that a person has put together to demonstrate their experiential learning activities over time. Portfolios can be paper-based or electronically-based, which we called an e-portfolio. In education, the portfolio has long been used by educators to show a student’s collection of work and accomplishments. According to Paulson et al. (1991), a portfolio is a “purposeful collection of student work that exhibits the student’s efforts, progress, and achievements in one or more areas”. A simple and more general definition of the portfolio by Batson (2002) stated that “a portfolio, electronic or paper, is simply an organised collection of completed work”. Zubizarreta (2009) has extended the definition of the portfolio as “a flexible, evidence-based process that combines reflection and documentation, engages students in the ongoing, reflective, and collaborative analysis of learning, and focuses on purposeful, selective outcomes for both improving and assessing

learning”. Paper-based portfolio content may include (but is not limited to these items only) the following:

- Resumes;
- Autobiographical descriptions of one-self;
- Personal aims and objectives;
- Primary sources of documents: assignments, project papers, etc.;
- Supporting documents: references, letters of confirmation/verification, testimony, certificates, etc.

In research and literature, there are many purposes for portfolios. There are portfolios that centre around learning, assessment, employment, marketing, and showcasing the best work (Barrett 2007). Portfolios in education show that many researchers focus on the uses and experiences of portfolios as a means of presenting student assessments that capture the learning process (Chang 2002; Kimball 2005; Barrett 2007; Bhattacharya and Hartnett 2007; Liu 2007; Barbera 2009; Chatham-Carpenter et al. 2009; Bolliger and Shepherd 2010; Cotterill et al. 2012).

#### *What is an e-portfolio?*

With the recent use of technological tools, a portfolio can be published and accessed online, and an electronic portfolio (or e-portfolio) has emerged. An e-portfolio has a similar meaning to a portfolio, but learner records are collected in an electronic environment (the web, computer, device, etc.). A much more comprehensive definition of an e-portfolio has been given by Challis (2005) as “selective and structured collections of information gathered for specific purposes and showing/evidencing one’s accomplishments and growth, which are stored digitally and managed by appropriate software, developed by using appropriate multimedia and customarily within a web environment and retrieved from a website, or delivered by CD-ROM or by DVD”. A more precise definition of e-portfolio in education can be an electronic collection of evidence that shows the student’s learning journey over time (Barrett 2010). The content of an e-portfolio is



like the paper-based portfolio, but the materials are in a digital form (audios, videos, images, web pages, etc.) as compared to a paper-based portfolio that can only include a collection of papers and documents with still images.

Another approach to defining an e-portfolio is to distinguish between e-portfolios as products and e-portfolios as tools or systems. The processes associated with e-portfolio development are intrinsically linked and, in the case of product and process, interdependent. An adapted diagram (Figure 2.1) from a 2007 Becta report “Impact of e-portfolios on learning” (Hartnell-Young et al. 2007) illustrates the essential links between e-portfolio presentations and processes, as well as introducing the concept of learners creating different e-portfolios for various purposes.

The most defining pedagogical feature of a portfolio from the 2007 Becta report is its support for reflective thinking. The process of students uploading artefacts, and then reflecting on how the artefact demonstrates a competency or learning progression, promotes reflective thinking.

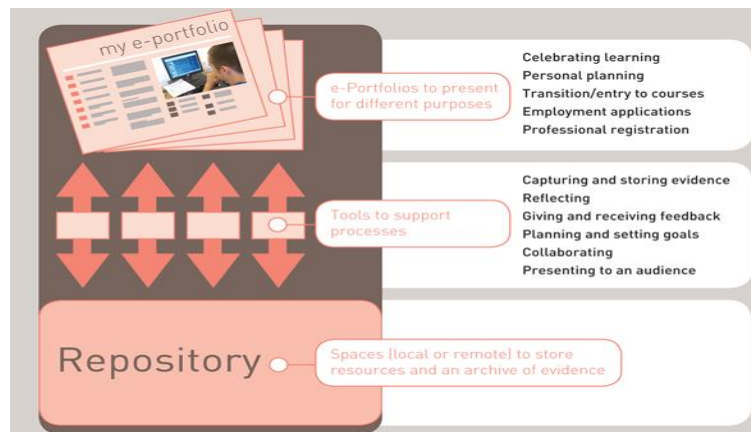


Figure 2.1: Understanding how e-portfolios work – Impact of e-portfolios on learning (source: Becta report (2007))

E-portfolios can be used as tools for enhancing learning with a variety of uses: for teacher training programs, for students in education, and for graduates to apply for work, this research will specifically focus on the use of portfolios for students in higher education. I based my research on Abrami & Barrett’s (2005) work that

stated, e-portfolio provides “a structured context for students and teachers so as to present text, audio, video and fluid form which can be easily processed and it integrates synchronous and asynchronous communication functions”.

Although portfolios and e-portfolios have significant differences, they share similar goals and aspirations. The concept of an e-portfolio goes beyond text and still images by incorporating multimedia to demonstrate knowledge and skills. Therefore, e-portfolio development is not only about “collections” of artefacts as evidence of learning and “reflection” on the process and product of learning, but it is also about “interactions” of learning through networking (Bhattacharya and Hartnett 2007). Table 2.3 summarizes some definitions of e-portfolio.

*Table 2.3: Electronic Portfolio Definitions*

<b>Author(s)/ Year</b>	<b>Definition</b>
(Batson 2002)	A portfolio electronic or paper, is simply an organised collection or completed work.
(Challis 2005)	Electronic portfolios are “selective and structured collections of information gathered for specific purposes and showing/ evidencing one’s accomplishments and growth which are stored digitally and managed by appropriate software, developed by using appropriate multimedia and customarily within a web environment and retrieved from a website, or delivered by CD-ROM or by DVD”.
(Meeus et al. 2006)	A portfolio is a collection of either of a number of actual pieces of work or representations of pieces of work. In education portfolio, in its most basic form, is a collection of exhibits relating to the abilities of students or pupils.
(Bhattacharya and Hartnett 2007)	Electronic portfolio is about “interactions” of learning through networking.
(Barrett 2010)	An ePortfolio (electronic portfolio) is an electronic collection of evidence that shows your learning journey over time.
(Meyer et al. 2010)	An electronic portfolio (EP) is a digital container capable of storing visual and auditory content including text, images, video and sound.

### 2.3.2 Types of E-Portfolio

There are various types of e-portfolio. There are types of e-portfolio based on who owns the portfolio as listed and discussed by Lorenzo & Ittelson (2005) in Educause Learning Initiative.

- i. Student e-portfolios – the most common type, involve collecting artefacts from personal and academic experiences and making them available through custom presentations.
- ii. Teaching e-portfolios – instructors use teaching e-portfolios to document their instructional expertise and experiences. Graduate students use teaching portfolios to showcase their work when applying for faculty positions.
- iii. Institutional e-portfolios – enable administrators to collect, archive, and reflect upon institutional output for the purpose of self-assessment.

These types of categorisation of e-portfolios are more common and have been widely implemented in the HEIs. I base my research on the student portfolios approach as I would like students to have the ownership and control over their e-portfolios. However, there are also categorisations of e-portfolios based on how they function as discussed by Villano (2006). Types of e-portfolios by Villano are:

- i. Developmental e-portfolio – comprises a record of assignments over time;
- ii. Reflective e-portfolio – includes personal reflection on the content as well;
- iii. Representational e-portfolio – shows achievements in relation to particular work or developmental goals, and is, therefore, selective.

Ivanova (2008) described and analysed the experience gained in the deployment of learning e-portfolios using Web 2.0 tools and services in a social-oriented network like Ning. The author classified the e-portfolio software products into five categories: commercial e-portfolio software systems, open source software products, LMSs with e-portfolio functions, content management systems with e-portfolio functions, and integrated systems and software families. The author stated

that the main functions that classify one system as an e-portfolio product include free text input: annotations, online content editing, internal/external links, uploading documents; publication: access control, types, publishing to the web, commenting, syndication, internal/ external communication, searching; organisation: collecting space/document management, categorization, selection, tracking; analysis tools: tracking, comparison, assessment; templates: advice, reflection, evaluation, presentation, modification of templates by user, assessment. This categorisation of e-portfolios was based on the software product it uses which makes full use of Web 2.0 tools and services. I take into consideration this type of e-portfolio into my research, especially the open source software product that would be beneficial to HEIs that would like to implement and use an e-portfolio system and save development cost.

Barrett (2010) focuses on the two major purposes for developing e-portfolios: portfolio as workspace and portfolio as a showcase. The “Working Portfolio”, or the workspace portfolio referred to by Washington State University (WSU), is focused on the process and documentation of learning, immediate reflection on learning and artefacts in collection (collection + reflection) regularly while the “Presentation Portfolio”, or the showcase/product portfolio, is focused more on the selection/reflection, direction, and presentation of artefacts (focus on product and documentation of achievement) that has been collected annually or by semester. Barrett has discussed how to balance both approaches to enhance learner engagement with the e-portfolio process and has clearly defined what an e-portfolio is and how several Web 2.0 tools can support e-portfolio development. Barrett then suggested that these two main approaches for e-portfolio development should be the framework for developing e-portfolios. To implement e-portfolios on campus, an institution must select an application best fitted to its needs and intentions (Reese and Levy 2009).

### 2.3.3 E-Portfolio in Higher Education

E-Portfolio is an alternative form of learning and assessment that is particularly appealing to educators due to the reasons that it includes the assessment of active learning and performance rather than only recall of memorised facts. It serves the interest of business and industry as well making a connection between activities in the classroom and real life in the education field. The concept of a digital or e-portfolio goes beyond text and still images only as new tools and technologies are developed. An e-portfolio can include multimedia to demonstrate knowledge and skills. The emergence of portfolios and e-portfolio applications in education has caused a revolution in the way students, and teachers collect, organise, display and share their learning journeys over time. The rapid change in Information and Communication Technology (ICT) tools and services such as computers, the Internet, mobile devices, and more recently Web 2.0, provide new ways to collect, access, share and exchange information and knowledge, and furthermore to assess student's achievement. As part of this process, students and teachers have embraced new technologies as a means of acquiring information and resources for learning and communicating with each other through social networks. The technological environment for teaching and learning activities has adapted to these changes as well as becoming a way to collect and organise learning evidence and artefacts of the students by using an e-portfolio application.

Batson (2002) highlighted the trends that make e-portfolios fascinating to so many people, especially in education as follows:

- Student work is now mostly in electronic form, or is based on a canonical electronic file, even if it is printed out;
- The web is everywhere;
- Databases are available through web sites, allowing students to manage large volumes of their work.

Meeus et al. (2006) stated that portfolio in education is:

- Student-centered;
- Competence-oriented;
- Cyclical with regard to action and reflection;
- Multimedia-oriented.

E-portfolios have been used as institutional devices to demonstrate student progress or to assess learning, but there is a need for students to feel that their e-portfolio belongs to them (Stefani et al. 2007). The researcher agrees that the students themselves are the key players and should play important roles and take responsibility in creating and developing their portfolios through organising their learning evidence over time. These serve as a basis for my gamified e-portfolio system design in the study. Therefore, I developed a student-based portfolio that is owned and controlled by the students and not the institution.

The following are the primary uses of e-portfolios identified by Reese & Levy (2009):

- i. Academic advising;
- ii. Institutional accreditation and departmental review;
- iii. Curricular development at the program level;
- iv. Career planning and development;
- v. Alumni development (or lifelong learning).

Other than that, relevant trends in higher education that make e-portfolios increasingly important to study as highlighted by Reese and Levy (2009) in the EDUCAUSE Centre for Applied Research Bulletin were as follows.

**1) E-portfolios help to facilitate and document authentic learning experiences.**

E-portfolios can contribute to archive student work and support colleges and universities by promoting and documenting learning that focuses on real-world, complex problems and their solutions, using role-playing exercises,

problem-based activities, case studies, and participation in virtual communities of practice. These are important in today's teaching and learning processes as learning materials and evidence are available in various types and forms using a broad range of technological equipment and tools.

**2) E-portfolios help to respond to the new era of accountability.**

E-portfolios provide one solution for capturing information requested by accreditation agencies or internal assessment committees which are required in higher education.

**3) E-portfolios help higher education institutions connect to today's students/learners who feel comfortable through multiple media by publishing their experiences on sites such as Facebook, YouTube, and Flickr.**

Students nowadays are open to broadcasting their life experiences to the world and mashing up media to communicate their ideas. E-portfolios provide students with a means to document and share their work in ways matching with their experiences while also facilitating meaningful self-reflection within an academic context.

According to Stefani et al. (2007), e-portfolios are being used to meet different learning requirements such as assessment, presentation, learning, personal development, multiple owner and working. There are also different applications of e-portfolios as been highlighted by Stefani et al.: course portfolios, programme portfolios and institutional portfolios, which show a variety of e-portfolio development depending on the purpose and objectives as suggested by Barrett & Carney (2005).

A purposeful plan for e-portfolio implementation by Stefani et al. includes specific issues:

- i. Stating the purpose – there should be a clarification of the purpose according to the learning context;

- ii. Determining the scope – identification of the issues that influence the scope of implementations (e.g., finances, human resources, and students);
- iii. Relating e-portfolio implementation to the curriculum – issues to consider including the target group, the user's readiness, the IT literacy skills, usage of e-portfolio by students, a standardised format for the e-portfolio, a public or private document (privacy issue), supporting students, reviewing and formative feedback; the primary issue to consider being the pedagogical principles and rationale for implementing e-portfolios;
- iv. Selecting content – consisting of the types of information that may be stored that is aligned with the agreed purpose.

Although e-portfolios give significant benefits as an emerging technology solution for assessing student achievement and showcasing learning evidence, there are still problems with e-portfolio implementations in higher education worldwide. E-portfolio users typically develop and use an e-portfolio application because their institution makes them use it (compulsory or as an assessment tool) and not because the users *want* to use it. Most e-portfolios in higher education institutions are institution-based portfolios and not student-based portfolios. Thus, I need to extend the investigation on what factors may drive the users to use the application by trying to understand the users' learning preference and investigate the current infrastructure in place.

#### **2.3.3.1 E-Portfolios in Malaysia**

In global education, the e-portfolio has been wide applied to many higher institutions in countries like Australia, the United Kingdom, the Netherlands, Canada and the United States of America, to provide students with a user-centered learning facility to manage information. The need for ICT to shape education institutions is inline with technological innovations of technology and twenty-first century learning.



The Malaysia Education Blueprint 2013-2025 (*Laporan Awal Pelan Pembangunan Pendidikan Malaysia 2013-2025*, 2012), demands that all institutions improve learning quality in Malaysia by improving internet access and online learning environments, by augmenting online content to share best practices, and by maximising the use of ICT for distance and self-paced learning to expand the capacity and quality of learning. Increasing use of a wide variety of ICT by faculty and students to support the teaching and learning process gradually causes a migration of student portfolios towards an electronic format which is also known as electronic portfolios or e-portfolio (Khoo et al. 2012). In Malaysian Skills Certification System (MSC), portfolio is used as a document to assess students' competency stage and it is kept in paper-based form in which the function is only limited to artefact storage (Rahim, 2015). Nevertheless, the use of printed portfolio has been identified to be less relevant with present situation and it has been less convenient in updating materials, static, restricted in information sharing, process management and evaluation, thus impede professional skills record improvement (Stefani et al. , 2007; McAllister et al. , 2008; Smyth et al. , 2011).

As the e-portfolio is still new in Malaysia, and e-portfolio development and implementation are still the key issues in Malaysian higher education, this research is important to give insights to the community of practice from students' perspectives.

#### **2.3.4 E-Portfolio Framework**

I would like to take into consideration Garrett's (2011) e-portfolio design model using ownership, ease of use, and social learning variables to predict user satisfaction. His research project was intended to refocus the design of electronic portfolio systems back onto learning. The conceptual requirements of the model are:

- 1) Ownership;
- 2) Social learning;

- 3) Ease of use;
- 4) Workflow of the “collect, select, reflect, access” cycle.

The findings of Garrett’s research show that students heavily use the social learning features. Ease of use, social learning, and ownership has proved to be critical variables in predicting user satisfaction. Other than that, the learning portfolio framework which consists of three processes – documentation, reflection and collaboration – identified by Zubizarreta (2009) also caught our attention (Figure 2.2).

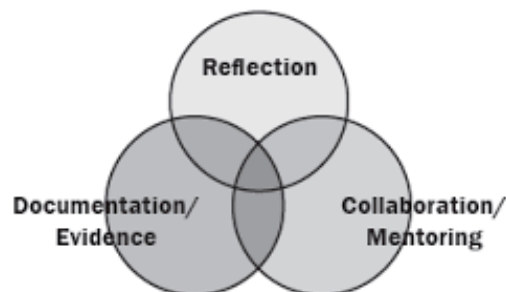


Figure 2.2: The learning portfolio model

The learning portfolio is a flexible, evidence-based process that combines reflection and documentation. It engages students in the ongoing, reflective and collaborative analysis of their learning. Learning portfolios focus on purposeful, selective outcomes for both improving and assessing learning. However, I like to make the e-portfolio less formal and less demanding and make the learner feel at ease to use it. Therefore, I have decided that the portfolio would be just a presentation or a showcase portfolio to assist learning instead of learning portfolio.

Whether it is a showcase portfolio or a learning portfolio, learner motivation is crucial to engage users in using an e-portfolio application. Students do not value the portfolio as part of a lifelong learning strategy, although the benefits of an e-portfolio as a useful tool for the configuration and presentation of education in and out of school could not be denied. The question is, how can we encourage student

or learner motivation and increase engagement in the portfolio creation and development process?

Barrett (2005) proposed three general components of the portfolio development process:

- Content – the evidence (learner’s artefacts and reflections);
- Purpose – the reasons for creating the portfolio, including learning, or professional development, assessment and employment;
- Process – the tools used, the sequence of activities, the rules established by the educational institution, the reflections that a learner constructs as they develop the portfolio, the evaluation criteria (rubrics), and the collaboration or conversations about the portfolio.

Besides this, Barrett (2005) also proposed three developmental levels of portfolio implementation regarding motivation:

- Extrinsic motivation – institutional directed content, purpose and process – external locus of control;
- Mixed motivation – learner ownership over one or two of the components;
- Intrinsic motivation – learner ownership of content, purpose and process.

The general components of a portfolio and the developmental levels of portfolio implementation serve as a guide for our research study. If the goal is to move toward the learner’s intrinsic motivation to develop and maintain their portfolio, then there needs to be learner ownership of the content, purpose and process, which means that the greater learner control over each of these components will lead to more intrinsic motivation (Figure 2.3) as proposed by Barrett (2005).

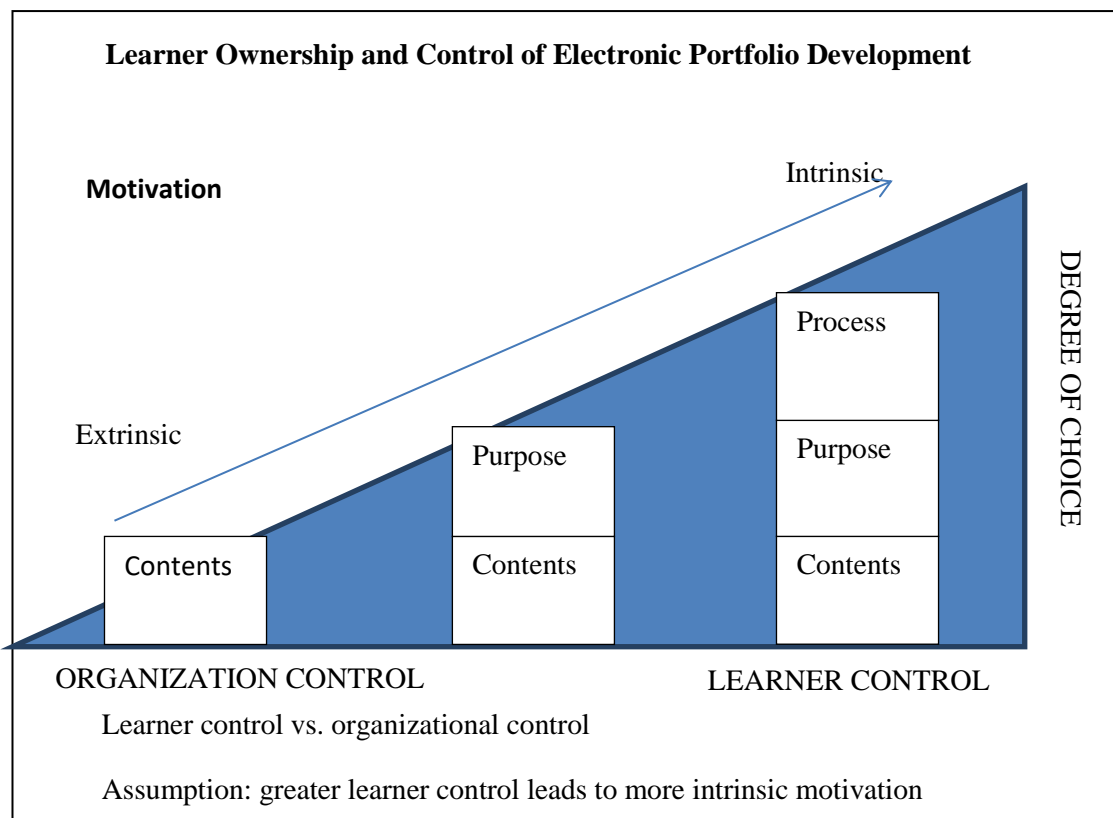


Figure 2.3: Learner ownership and control of electronic portfolio (Barrett 2005)

Bhattacharya & Hartnett (2007) suggested that an “e-portfolio is not only about ‘collection’ of artefacts as evidence of learning and ‘reflection’ on the process of and product of learning, but it is also about ‘interactions’ of learning. In this ‘networking’ age no learning can be labelled as independent and individual”. Students want education software that helps them to connect with each other, lets them express their individuality, and is easy to use (Jafari et al., 2006; Jafari et al., 2007). Unfortunately, most portfolio software systems do not provide robust features for collaboration and sharing (Garrett, 2011). A major challenge with e-portfolios today is to maintain the learner’s intrinsic motivation to willingly engage in the portfolio process. Barrett (2005) suggested the use of multimedia tools and the use of weblogs or “blogs” and “wikis” to engage the learner. These are strategies that involve and engage learners today, especially young people. This is supported by findings in (Hartnell-Young et al., 2007) that stated staff and faculty who use portfolios for their own learning are less satisfied with education software than social software as quoted by one of them “those involving dedicated e-

portfolio tools have been far less satisfactory than those involving social software tools such as blogs, wikis, social networking sites.”. Based on Barrett's (2005) theory of learner ownership and control of electronic portfolio and gamification principles, I propose the use of a blog, and game-like techniques (leaderboards and points), to trigger students’ motivation to increase engagement and improve the e-portfolio usage.

### **2.3.5 Advantages and disadvantages of e-portfolio**

There are many advantages and disadvantages of e-portfolio. The discussion of e-portfolio implementation in the graduate recruitment process results by Leece (2005) highlighted the primary advantages of e-portfolios as being easy to use and being well-organised products. Leece also stated that the primary criticisms of the e-portfolios were that they would be too time-consuming for employers to utilise in the recruitment process, and that the various e-portfolio products do not integrate with online recruitment systems.

As my research focus is the e-portfolio in an HEI, I am interested in exploring how e-portfolios can assist universities and colleges connect to today’s undergraduates who feel comfortable communicating through multiple media. Reese & Levy (2009) discussed the trends in higher education that shape the context in which an e-portfolio implementation may be advantageous:

- i. “E-portfolios can help address the call to facilitate and document authentic learning experiences;
- ii. E-portfolios can help respond to the new era of accountability that, according to the Spellings Commission, will place additional pressures on higher education;
- iii. E-portfolios can help universities and colleges connect to today’s undergraduates who feel comfortable communicating through multiple

media by publishing their experiences on sites such as Facebook, YouTube, and Flickr.”

Student opinions on the use of e-portfolios at The Johns Hopkins University have been summarised from six pilots by Reese & Levy (2009):

- i. “E-portfolios provide value;
- ii. E-portfolios are easy to use;
- iii. E-portfolios capture more than the traditional academic experience;
- iv. E-portfolio use increases when integrated with other applications;
- v. E-portfolio use increases with external motivation.”

Based on the findings, we can say that the e-portfolio does have advantages from the student’s point of view and more exploration is needed to get a deeper insight of these opinions.

As much as an e-portfolio system benefited the users, there are also disadvantages of it as highlighted by previous researchers such as:

- Accessibility is not limited, and thus students need to be careful in selecting materials to be uploaded in their ePortfolio. An unnecessary material can reduce the marketability of a student if uploaded. Thus, students are responsible for their own e-portfolio and the information it contains (Hanum et al. 2016).
- Danowitz (Danowitz 2012) also mentioned that uploading large files into an ePortfolio is difficult and time consuming. Moreover, users have to protect their password for security purposes and to always back up their files because of server problems.
- Time, inadequate system, lack of support, cost, lack of flexibility, not enough feedback are disadvantages of e-portfolio from (Parker et al. 2012)

A study by Tosh et al. (2005) found four emerging themes in students’ views of e-portfolios: buy-in, motivation, assessment and the e-portfolio technology, which

point to the need to have alignment between the goals of the implementer of the e-portfolios and how the e-portfolio will be used by the students. Minor themes are emerging from students' responses in this study, as stated by the students, including that an e-portfolio should not be compulsory because by making an e-portfolio mandatory automatically raises barriers and denotes it as another "assignment" for many students. Tosh et al. urged that it is necessary to have i) a system that is inviting and engaging, and ii) sells the e-portfolio to the students so they can see the benefits of using it. Thanaraj (2012) pointed out several factors which must be discussed, reflected and agreed upon before using e-portfolios and deciding how it fit within the academic context as follows.

- Purpose – are they for learning, assessment, personal and career development, employment, or as an official record of a student's work?
- Learner control and ownership – how much control should students and tutors have?
- Level of tutor engagement – identifying the feedback e-portfolios materials and reflections and the frequency of feedback.
- Assessment – what type of assessment should be included – a pass-fail system or a looser assessment system?

Thus, the success of this approach depends on the purpose, practices and structures that guide the implementation of e-portfolios in the HEI. The design and development of an e-portfolio framework for the MARA HEI is a crucial process in order to ensure successful implementation of e-portfolio, and it will be an innovation towards the learning and assessment process in the selected community of practice.

## 2.4 Gamification

Gamication and games are two tools used under the broader heading of gameful design (Armstrong et al., 2016). Next section defines the terms *game*, *game-based learning*, and *gamification*. People usually get confused between these terms, and it is crucial to be able to differentiate those terms and draw a clear distinction between them.

### 2.4.1 Definition

*What is a game?*

A *game* is a form of recreation constituted by a set of rules that specify an object to be attained and the permissible means of attaining it (Kelley 1998). Another definition given by Salen & Zimmerman (2003), is that “a game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome”. Juul (2003) provides a more detailed definition of a game as a “rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable”, which makes the relationship with a learning process even more obvious. Koster (2004) defined a game which includes the emotional reaction of players based on the idea of fun as “a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, that results in a quantifiable outcome often eliciting an emotional reaction”. Computer games are intrinsically motivational for most, if not all, people (Oblinger 2004). Games form an ideal learning environment with their built-in permission to fail, encouragement of out-of-box thinking, and sense of control (Kapp 2012a). To combine games with learning with the intention to increase motivation and engagement seems to be an effective way to make studying and learning more fun and easier. However, it is not an easy task but still,



“games can make learning so much fun that they mask a large amount of learning required to play them successfully” (Whitton 2009). Certain games, when used in appropriate and pedagogically sound ways to support learning, have the power to engage learners in a profound way (Whitton 2011).

In my opinion, I view a game as participation in activities for enjoyment, learning and competition. Educators have long been using games in teaching and learning activities. The undeniable advantage of games in learning is how they drive and create engagement, and the fun-factor they bring in, that makes a boring and mundane task interesting.

Under the umbrella of game, the emergence of serious games has gained attention in the market as people find it useful for training and educating people. Serious games use traditional game design techniques for serious concepts such as business, education, environmental or social issues. As suggested by Susi et al. (2007), serious games usually refer to games used for training, advertising, simulation, or education that are designed to run on personal computers or video game consoles. Susi et al. (2007) also suggested that serious games are associated with “games for purposes other than entertainment”.

From Michael & Chen’s (2006) point of view, serious games encompass the same goals as edutainment, but extend far beyond teaching facts and rote memorization, and instead include all aspects of education – teaching, training, and informing – and at all ages. This gives a more comprehensive meaning of a serious game in education. A more formal definition of serious games by Zyda (2005), “it is a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives”. I base my view on serious games as a game designed for a specific and serious purpose other than pure entertainment and enjoyment with specific rules to make it simple to understand.

### *What is game based learning?*

*Game based learning*, on the other hand, refers to “a branch of serious games that deals with applications that have defined learning outcomes” (en.wikipedia.org, n.d.). With this approach, a fully-fledged interactive game that uses a game as the foundation is delivered to the learners, and the training content is added to it. Game based learning also describes an approach to teaching, where students explore relevant aspects of games in a learning context designed by teachers. Teachers and students work together to add depth and perspective to the experience of playing the game. In our point of view, game-based learning refers to a serious game with defined learning outcomes.

### *What is gamification?*

“Gamification” is an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience (UX) and user engagement (Deterding et al. 2011). Gamification is not a formal gameplay; it is just bringing the game elements into a non-gaming context, environment or application. Domínguez et al. (2013) defined gamification as the use of game mechanics and game design techniques, such as awarding points, rewards or other incentives, in non-game contexts, to change behaviour. Muntean (2011) define gamification as the use of gameplay elements for non-game applications. This is supported by other researchers (Deterding et al., 2011; Wu, 2011) who stated gamification as the use of gameplay mechanics in non-gaming applications to encourage a desired type of behaviour. Chris (2014) suggested that *gamification* does not refer to a stand-alone game and only refers to game-like applications in a non-game context, therefore players are not constantly aware they are actually playing a game. Deterding et al. (2011) refer to gamification as the use of gameplay mechanics in non-gaming applications to encourage a desired type of behaviour. By using techniques such as scoreboards and personalised fast feedback, people feel more ownership and purpose when engaging with tasks (Kim et al. 2009). A gamified application is not a game, but it only uses attributes of a game, such as game elements, game design,

game mechanics, game dynamics and gaming psychology. A clearer definition by Filsecker & Hickey (2014) proposed gamification as a design strategy attempting to reproduce the engagement power of games by emulating key game mechanics without actually designing a full game and implementing them in a non-gaming context (e.g., industry, education, etc.). I based my research on Zichermann & Cunningham’s (2011) definition of gamification as the process of game-thinking and game mechanics to engage users. It is a strategy to introduce normal activities with the ideas of motivation and engagement based on gaming approach. Gamification has an aspect in common with the game, which is “fun”, which is the key reason for people to play games and evokes behaviour such as engagement (Kankanhalli et al. 2012). Table 2.4 presents a comparison between games, game-based learning and gamification.

*Table 2.4: Game, game-based learning, and gamification comparison (source from [www.upsidelearning.com](http://www.upsidelearning.com))*

<b>Game</b>	<b>Game based learning</b>	<b>Gamification</b>
Games are just for fun, and may or may not have defined rules.	Games have defined learning objectives.	May just be a collection of tasks with points or some form of rewards.
Winning and losing is a part of the game.	Losing may or may not be possible because the point is to motivate people to take some action and learn as an end result.	Losing may or may not be possible because the point is to motivate.
Gameplay comes first, rewards are secondary.	Sometimes just playing the game is intrinsically rewarding.	Being intrinsically rewarding is optional.
Games are usually hard and expensive to build.	Are usually hard and expensive to build.	Gamification is usually easier and cheaper to develop.
Story and scenes are part of the game	Content is usually morphed to fit the story and scenes of the game.	Usually, game-like features are added to the LMS or any other system rather than the content.

## **2.4.2 Gamification in Education**

Games and game-like elements have already been used widely in various domains including marketing, politics, and health and fitness (Lee and Hammer 2011). Gamification in the educational context can help increase student motivation in learning, and schools have been using game-like elements in classroom activities like points and badges as a reward for desired behaviours to motivate student (Lee and Hammer 2011). Teachers have also been using a ranking system by promoting a “level up” experience to students who reach specifically required levels of understanding and achievement. However, it remains a challenging task to fully engage students in classroom activities.

The effects of gamification in e-learning in higher education to improve student engagement, with a particular focus on widely used applications of collections and artefacts that demonstrate development or evidence learning outcomes, skills or competencies, have recently attracted the interests of educators and others including researchers (Kim et al. 2009; Lee and Hammer 2011; Glover 2013; Nah et al. 2013; Hjert and García-yeste 2015).

Muntean (2011) performed a theoretical analysis of gamification as a tool to increase engagement in e-learning platforms. The theoretical analysis, Muntean argues, was by applying game mechanics and dynamics to tasks and e-learning processes, we can increase user engagement with an e-learning application and its specific tasks. Furthermore, the use of this game-like technique can improve the feel of ownership and purpose when engaging with tasks, and this matches the previous theoretical analysis by Barrett (2005).

### **2.4.2.1 Educational potential of gaming and games**

Computer and games have caught the attention of scholars across a variety of disciplines. In the beginning, the importance and educational potentials of gaming and games had been ignored by educators due to the social consequences (Squire

2003). However, Squire (2003) also argued that computer and games are also popular and influential due to the following reasons:

- Computer and games elicit powerful emotional reactions in their players, such as fear, power, aggression, wonder, or joy;
- Computer and games playing occur in rich socio-cultural contexts, bringing friends and family together, serving as an outlet for adolescents, and providing the “raw material” for youth culture;
- Computer and games research reveal many patterns of how humans interact with technology that become increasingly important to instructional technologists as they become designers of digital environments.

We also know that computer and games have long been known for their success in modelling behaviour and engaging users. Despite the disadvantages of using computer games in a classroom (Bakar et al. 2006), like students losing the real focus on the content and becoming absorbed in the games themselves, becoming addicted to games, spending too much time playing computer games but not studying enough for their courses, and requiring time for game-playing which may not be appropriate in the educational context, players however seem to like the game-based approach to learning and find it motivating and engaging (Connolly et al. 2012). Quite a number of researchers have been using games as a means of researching individuals, and Griffiths (2002) argues why games may be useful educationally:

- Games can be used as research and/or measurement tools, and furthermore, as research tools, they have great diversity;
- Games attract participation by individuals across many demographic boundaries (e.g., age, gender, ethnicity, educational status);
- Games can assist children (players) in setting goals, ensuring goal rehearsal, providing feedback and reinforcement, and maintaining records of behavioural change;

- Games can be useful because they allow the researcher to measure performance on a very wide variety of tasks, and can be easily improved, standardised and understood;
- Games can be used when examining individual characteristics such as self-esteem, self-concept, goal-setting and individual differences;
- Games are fun and stimulating for participants, and consequently, it is easier to achieve and maintain a person's undivided attention for extended periods of time, and because of the fun and excitement, games may also provide an innovative way of learning;
- Games can provide elements of interactivity that may stimulate learning;
- Games allow participants to experience novelty, curiosity and challenge, which may encourage learning;
- Games equip children with state-of-the-art technology, which may help overcome technophobia (a condition well-known among many adults), and over time it may also contribute to eliminating gender imbalance in IT use (as males tend to be more avid IT users);
- Games may assist in the development of transferable IT skills;
- Games can act as simulations which allow participants to engage in extraordinary activities and to destroy or even die without real consequences;
- Games may help adolescents regress to childhood play (because of the ability to suspend reality in video game playing).

With user engagement issues in e-portfolios, the issues of bridging the gaps between e-portfolio users (digital immigrants and digital natives) in higher education, and the educational potential of gaming and computer games, I want to explore a way to engage users by trying to integrate game elements in the education context and learning with technology, specifically in an e-portfolio system.

### 2.4.3 Gamification Principles

Due to the assumptions that the kind of engagement that gamers experience with games can be translated to an educational context, towards the goals of facilitating learning and influencing student behaviour in an e-portfolio system, understanding of gamification principles is required. From this understanding, I hope to harness the power of games for motivation and to apply it to an e-portfolio system to try and make the users voluntarily spend more hours using the gamified e-portfolio. The principles of gamification by Flatla et al. (2011) consist of the following.

**Goal orientation.** This allows the learner to progress systematically from a beginner to an expert or master as they demonstrate mastery of the skills and knowledge. Having clear and well-defined goals of the game also helps to sustain the learners' motivation and engagement.

**Achievement.** Learner sense of gratification increases, which further enhances their motivation and engagement when they are recognised for their achievement. Thus, recognition of achievement can also be applied in the context of educational games to increase learner engagement and, consequently, learning achievement.

**Reinforcement.** Based on the behavioural learning model, learning takes place through reinforcement like praises, compliments or rewards. In the educational context, positive reinforcement offers gratifications to learners and can be used to promote learning through game elements. Negative feedback (or reinforcement), on the other hand, can provide corrective information, knowledge or skills to help learners achieve their learning goals.

**Competition.** A game motivates a player using intrinsic rewards and competitive engagements. In the educational context, competition plays a significant role in sustaining or increasing a learner's engagement and focus on the learning task.

**Fun orientation.** Fun is a requirement of most computer games. For the educational context, having a fun component or orientation is very important for the experience to be useful and engaging for learners.

These gamification principles will guide the design and implementation of the gamified e-portfolio application.

#### **2.4.4 Concept of Gamification**

To be able to apply a gamification approach to the e-portfolio system, we need to understand the aim of gamification.

##### **2.4.4.1 Aim of gamification**

*What is the aim of gamification?*

The primary goal of gamification is to raise the engagement of users by using game-like techniques such as scoreboards and personalised fast feedback (Flatla, Gutwin and Nacke, 2011). Other than that, the aim of gamification is to promote desirable behavioural change through various game design elements such as rewards for achievement and points to drive one's goal, in addition to deeper inspiration and engagement (Burke, 2011). The use of gamification to promote behavioural change was supported by Wu (2011) who defined gamification as the use of game elements and techniques in a non-game context to drive game-like player behaviour. To drive a user's behavioural change, understanding of what factors or elements that trigger user engagement is critical. These identified triggers or appropriate game mechanisms can be used in the design of a gamified system to improve the impact of the system. Besides that, Nah et al. (2013) suggested that gamification can be used to promote a business, a product, a political candidate, or wellness. To get desired outcomes from gamification approach, motivations and rewards, as well as suitable design elements, play important roles.



### 2.4.4.2 Game elements

Game elements (Table 2.5) are the rules, features, dynamics, principles and control mechanisms of games. These elements “govern a behaviour through a system of incentives, feedback [loops] and rewards with a reasonably predictable outcome” (Dorling and Caffery 2012) and include features such as points, levels, badges, achievements, progress bars, challenges and competitions, negative or positive feedback, virtual goods and leader boards.

Table 2.5: Game elements (adapted from Bunchball (2010))

Game mechanics	Game dynamics
Points	Reward
Levels	Status
Trophies, badges, achievements	Achievement
Virtual goods	Self expression
Leaderboards	Competition
Virtual gifts	Altruism

The three attributes that can characterise game mechanics are:

- Game mechanics type: progression, feedback, behavioural (Figure 2.4);
- Benefits: engagement, loyalty, time spent, influence, fun, SEO, UGC, virality;
- Personality type: explorer, achiever, socializer and killer (Figure 2.5).

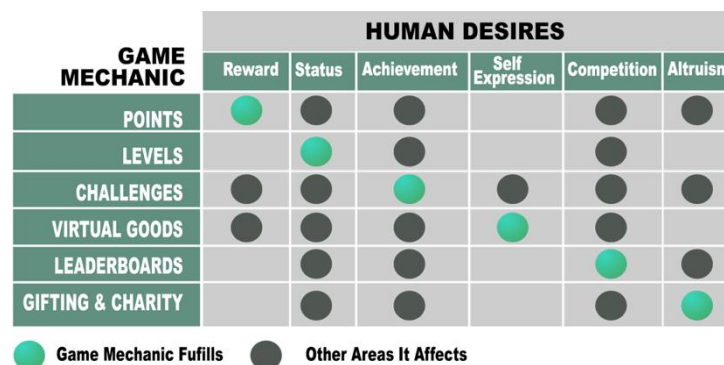


Figure 2.4: Game mechanics vs. human desires (source: Bunchball (2010))



Figure 2.5: The Bartles Type (Source: frankaron.com)

Our gamification approach is based on Werbach’s game elements pyramid (Figure 2.6). I inserted selected gamification components to derive the mechanics and dynamics of the selected game components. What makes my approach different is that the game elements are based on the previous literature review and students’ preferences from the pre-survey.

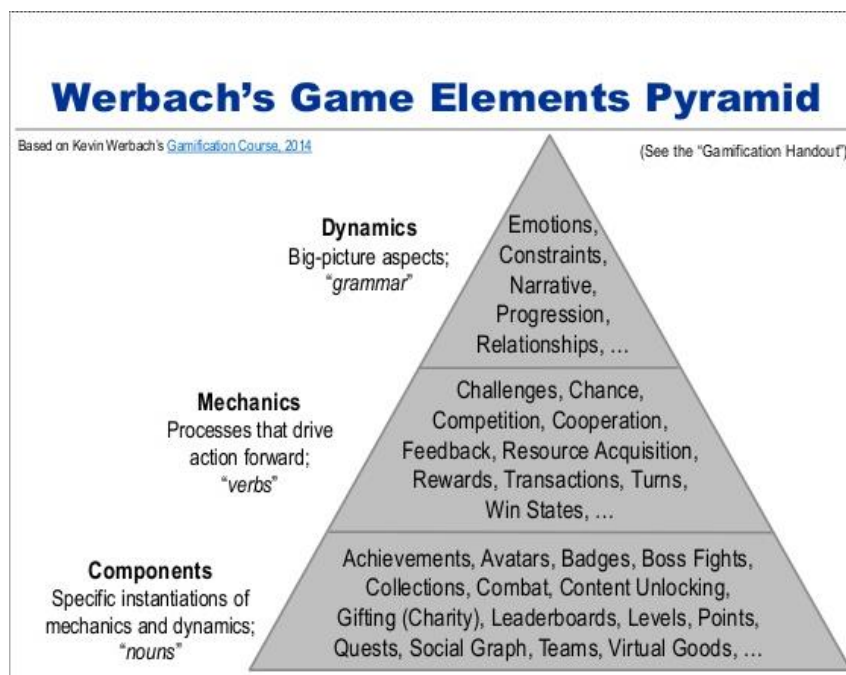


Figure 2.6: Game elements pyramid (Werbach 2012)

### 2.4.4.3 Reward categories

There are different forms of reward in gamification. Table 2.6 listed the reward categories of gamification (Burke 2011).

*Table 2.6: The reward categories (adapted from (Burke 2011))*

<b>Reward</b>	<b>Description</b>	<b>Example</b>
Monetary	Financial benefits for users	Voucher
Status	Recognition within a community	Recognition as expert
Achievement	Significant accomplishment	Achieving sales target or next level in the game
Learning	Gaining skills and knowledge	Learning science concepts
Other self-development	Self-development benefit	Health and wellness
Social and community impact	Positive impact within a community or society at large	Raising funds for charity, solving environmental problems

### 2.4.4.4 Design elements

Other than reward, the design elements of gamification also play an important role to achieve the desired outcomes. Table 2.7 describes the design elements of gamification based on previous research by Zichermann & Cunningham (2011). The design elements focus on seven primary elements in implementing game mechanics: points, levels, leaderboards, badges, onboarding, challenges/quests, and social engagement loops. Furthermore, Zichermann & Cunningham suggested

that onboarding and quests should work together to balance challenges and skills, which is a necessary requirement for user engagement.

*Table 2.7: Primary elements in implementing game mechanics (adapted from Zichermann and Cunningham (2011))*

<b>Design element</b>	<b>Description</b>
Points	Are the basic game components that drive one's goal
Levels	Indicate progress towards higher-level goals and the fulfilment of intermediate goals
Leaderboards	Allow players to compare their performance with others
Badges	Signify the recognition of one's accomplishment or achievement
Onboarding	Refers to the act of bringing a novice into the system to convey and manage complexity through scaffolding
Challenges/quests	Can be used to create challenges for users
Social re-engagement loop	Refer to viral loops that are capable of continually re-engaging users

Other similar design elements to those proposed by Zichermann & Cunningham are the design elements proposed by Kankanhalli et al. (2012). These are summarised in Table 2.8.

*Table 2.8: Design elements for gamification (adapted from Kankanhalli et al. (2012))*

<b>Design element</b>	<b>Description</b>
Points	Users can earn different types of points by participation and performance.
Virtual badge	Users can collect badges that visually indicate their achievements as they accomplish specific tasks and missions.
Leaderboard	A leaderboard enables users to compare their own performance with others and stimulates competition.

<b>Design element</b>	<b>Description</b>
Level & status	Level typically shows progress in the game. The level may indicate by a numeric value or a user's status such as "novice" or "expert".
Quest and challenges	Quest and challenges guide users to perform pre-defined tasks. They help inexperienced users to learn how to move forward.
Progression	A visual tool that displays the advancement of users and the remaining work to reach a goal. It motivates users to accomplish a pre-determined goal.
Viral loop	The steps a user goes through between entering the site to inviting the next set of new users. In most social games, users can play better by inviting and working together with others.

There are also frameworks related to game design in general like the MDA (mechanics, dynamics, aesthetics) framework by Hunicke et al. (2004) that has been used to analyse the building of games.

#### *What is game mechanics?*

Mechanics refers to the base components of the game such as its rules, player actions, and data structures and algorithms, that govern player behaviours (Hunicke et al. 2004; Wu 2011). It is the input from the player that causes a set response from the system (technical underpinnings), or it can be defined as actions and system that make progress visible.

#### *What is game dynamics?*

Game dynamics describe the run-time behaviour of the mechanics acting on player inputs and their interactions (Hunicke et al. 2004). Game dynamics are what

happens when the players want, goals and intentions come in contact with the mechanics. Basically, the gameplay (emergent player/system interactions) can be defined as motivational desires used over time to create engaging experiences.

*What is aesthetics?*

Aesthetics describe the desirable emotional responses evoked in the player when they engage with the game (Hunicke et al. 2004).

#### **2.4.4.5 Game thinking**

*What is game thinking?*

This is the use of game-like approaches to solve problems and create better experiences (Marczewski 2015). It is about using fun and game principles to design solutions to real-world problems.

Recent ideas by Marczewski (2015) proposed that better user engagement is achieved through game thinking, not game mechanics. Engagement is the power metric which drives recency, frequency, duration, virality and ratings. Figure 2.1 illustrates game thinking that has been broken down by the design goal. As we can see, if the design goal is towards gamification, the integration of game elements into a non-game context is enough.

### Game Thinking, Broken down by design goal.











	Game Thinking	Game Elements	Game Play	Just for Fun
Game Inspired Design				
Gamification				
Serious Game / Simulation				
Game				

Figure 2.7: Game thinking broken down by design goal (Marczewski 2015)

Figure 2.7 illustrates how gamification is different compared to other approaches in the game thinking strategy like a game inspired/playful design, serious games, simulation, and play/games/toys. Gamification can be intrinsic or extrinsic or both. Extrinsic gamification is where game elements (like points, badges, progress bars, etc.) are added to a system. Intrinsic gamification is more about using motivation (RAMP: relatedness, autonomy, mastery, purpose) and behavioural design to engage users. According to Marczewski (2015), RAMP is the four key motivational drivers that can be used as foundations for all good gamified systems. In order to design a gamified e-portfolio, I started with an extrinsic gamification approach by using and adding selected game elements into the e-portfolio system. I carefully design the tasks and activities developing the e-portfolio content and include a reward system by giving points and badges where appropriate to motivate students to keep updating their e-portfolio content.

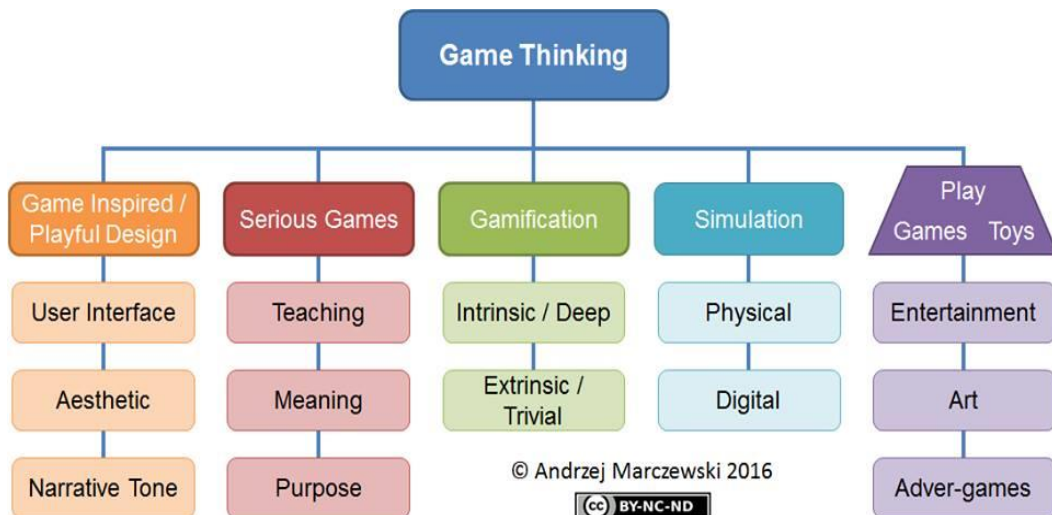


Figure 2.8: Game thinking (Marczewski 2015)

In the beginning, I use the Marczewski (2015) decision trees (Figure 2.9) to decide whether gamification of the e-portfolio is the appropriate approach for my study and base my research from the gamification perspectives to explore the effect of game elements towards user engagement and motivation to use the e-portfolio system. This game thinking decision tree guides us to choose an appropriate approach for our study because the main purpose of the gamified e-portfolio is not for entertainment but more to support learning. I base my decision using the decision tree on the left. My aim is to create a safe virtual environment to test e-portfolio implementation in higher education, and I do not want it to be a real game to teach something specific but rather a space where students can collect, organise, share and give feedback to one another among community members. I also envision myself to use game elements and ideas to motivate and engage students in using the e-portfolio system.



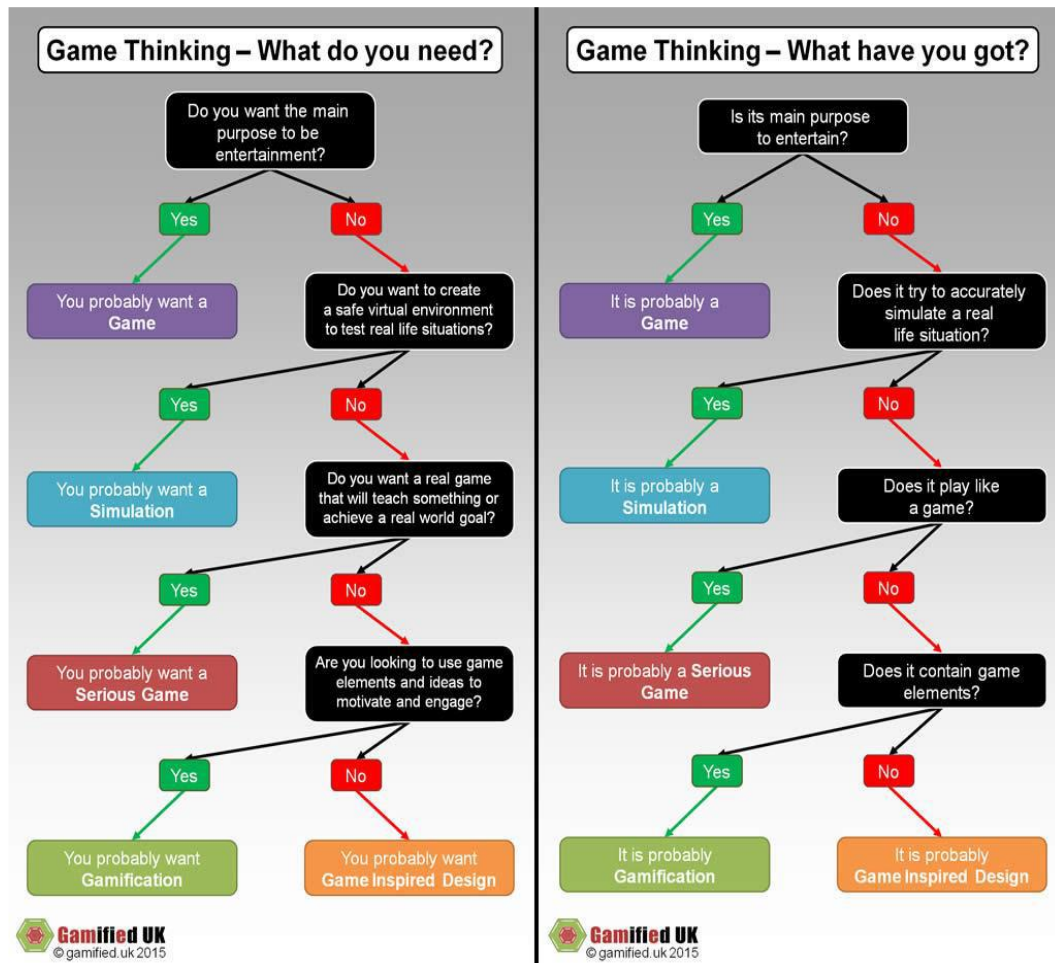


Figure 2.9: Game thinking decision trees (Marczewski 2015)

#### 2.4.5 Advantages and disadvantages of gamification

An effective gamification concept can captures and retains learners’ attention, engages, entertains and challenges them, and teaches them (Furdu et al., 2017). However, gamification is still considered new and many work need to be done to explore on how and why gamification works and what makes it effective according to Andrew Phelps (Zaino, 2013). This motivate me to explore gamification concept in e-portfolio system. Next section will list down the benefits of gamification as well as the pitfalls of using it.

### *Advantages of gamification*

- Increases student engagement (Kapp, 2012b) – where student need to solve a problem or complete a task, and upon the success of the given task, the student will be presented with the next level problem or task to complete. Student develops and practices problem solving strategies across different levels of play or context which improves knowledge absorption and retention.
- Versatile (Furdu et al., 2017) – by using gamification, most learning needs can be fulfilled, including product sales, customer support, soft skills, awareness creation, etc., resulting a performance gain for organizations.
- Better learning experience (Furdu et al., 2017) – it is obtained by combining “fun” with learning. A good gamification strategy will make participants more active and high levels of engagement will increase feedback and retention.
- Provide immediate feedback (Furdu et al., 2017) – it can be used as a correction of students’ actions and should be a stimulus to their further activities and help students adjust to learning challenges.
- Applies and practices learning within a meaningful and authentic context (Bellotti et al., 2010) with a better learning environment (Furdu et al., 2017) – the learning experience is personalized; the learners could evolve in their own rhythm, in a safe way. Gratification system provides an effective, informal learning environment that helps learners practice real life situations and challenges.
- Places students within systems where they can safely manipulate and explore functions (Squire 2007).
- Assists with transfer of learning to real world contexts and problems (Kapp, 2012b).
- Promotes cooperation, teamwork, communities of learners and practice (Bellotti et al., 2010).

Therefore, gamification is more than just surface level benefits granted by points, badges, reputation level as it can motivate behavioral change, especially if combined with the scientific principles of cyclical learning and ensuring retention.

#### *Disadvantages of gamification*

- Requires access to computer and Internet – school districts do not have budget available to purchase computers, and students of low income families may not have technology available to them in the home to support learning.
- Absorb teaching resources or budget for other resources (Lee and Hammer, 2011) – budget is allocated to new computers or server provider.
- By making play mandatory, gamification might create rule-based experiences that feel just like school (Furdu, 2017).
- Activities need to be designed so that students can repeat them in case of an unsuccessful attempt . The effort, not mastery, should be rewarded, and the students should learn to see failure as an opportunity, instead of becoming unmotivated or fearful (Kiryakova et al., 2014).
- Distracts learners from learning objectives (Bellotti et al., 2010) – poor design in game leads to disengagement and confusion or teacher fails to implement gaming to effectively support curriculum and learning.
- Leads to overstimulation or game play addiction (Bellotti et al., 2010).
- Blurs boundaries between virtuality and reality (Bellotti et al., 2010).

In summary, as stated by (Gee, 2005), “When we think of games, we think of fun. When we think of learning we think of work. Games show us this is wrong. They trigger deep learning that is itself part and parcel of the fun.”.

## 2.5 Student Engagement and Motivation

Student engagement characterises both the time and energy students dedicate to communications with others through academically purposeful activities (Kuh and Hu 2001). Student engagement describes a learning task or a value to refer to the cognitive process, active participation, and emotional involvement of students in specific learning procedures (Pellas 2014). There are three interrelated factors of student engagement that have been agreed upon by many researchers (Trowler 2010; Kraft and Dougherty 2013), as follows.

- i. Cognitive – refers to the extent and utilisation of an intellectual effort that students spent in learning projects. It includes learning goals, students' intrinsic motivation, self-regulation and abilities to apply strategies with the aim of revealing the new knowledge.
- ii. Behavioural – refers to the positive conduct, effort, and students' participation in the classroom and learning procedures (active responses of students, formulation of relevant questions, solving problems, participating in discussions).
- iii. Emotional – refers to the students' interest, identification, and positive attitudes or values about the learning process. It detects emotional reactions like a high level of interest and positive attitudes.

According to Chapman (2003), students' engagement in the learning process can be interdependent because students with positive attitudes towards learning (emotional engagement) can easily be adopted more with effective learning strategies (cognitive engagement). Bakker (2005) viewed the student engagement in a workflow which combines the student's inspiration and creativity to participate in activities with appropriate feedback from the instructor. Belcheir et al. (2001) reported that the quality of online communications and the degree of interaction between users are also significant for course completion depending on the learning content and the delivery method that is followed each time, giving the meaning of

engagement in online settings. There are researchers who agree upon using technology/social media as an educational tool that can lead to increased student engagement (Patera et al. 2008; Annetta et al. 2009; Chen et al. 2010; Junco et al. 2011; Junco 2012). Technology may foster engagement and self-directed learning because it provides an undeniable source of interactive tools for academic purposes like taking notes, forums discussion, access to supplementary resources, software and applications and facilitate student-student and student-faculty interactions (Hyden 2005; Weaver and Nilson 2005; Juniu 2006; Fried 2008). Information and communication technologies (ICT), especially the internet, can enable the widespread sharing of valuable resources in both traditional and interactive forms, affording the means of collaborative learning distributed over time and place as needed (Livingstone, 2012). If used well, it is also popular with children, thus motivating their learning (Passey et al., 2004; Jewitt et al., 2010). According to Nelson & Kuh (2005), students who use information technology for academic purposes are reported to more likely contribute and participate in active, academic collaboration with other students. Thus, supporting a deeper connection between the students, educators, and course content, such partnership specifies that as engagement with technology increases, engagement with academics also increases (Mehdinezhad 2011). My work will be based on student engagement in online settings with the use of e-portfolios.

### **2.5.1 The Engagement Theory**

To engage users in using the e-portfolio application, I look to a model for learning in a technology-based environment, namely the *Theory of Engagement* developed by Kearsley and Schneiderman (1998). This theory synthesises many elements from past theories of learning. Students must be engaged in their course work for effective learning to occur. The three primary means to accomplish engagement are: (1) an emphasis on collaborative efforts; (2) project-based assignments; (3) a non-academic focus. It is suggested that these three methods result in learning that

is creative, meaningful, and authentic. The authors of the engagement theory propose three basic principles of engaged learning:

- (1) Relate: learning through collaboration;
- (2) Create: learning using a project-based approach;
- (3) Donate: learning using an outside (authentic) focus.

### 2.5.2 Motivation definition

There are many definitions of motivation. Motivation, intrinsic or extrinsic, can be defined as the need and action in the direction of achieving specific goal or task.

Deci & Ryan (2000) define intrinsic motivation as ‘the self-desire to seek out new things and new challenges, to analyse one’s capacity, to observe and gain knowledge’ and define extrinsic motivation as ‘the performance of an activity in order to attain the desired outcome and it is the opposite of intrinsic motivation’. Therefore, we can say that:

**Intrinsic motivation** is the desire for change coming from within the individual, who may want to do something (e.g. learning) because they are interested, feel competent and enjoy doing it.

**Extrinsic motivation** is the opposite of intrinsic motivation as it comes from outside the person, who is bribed or rewarded (e.g., earn a prize) to do something. Extrinsic motivation can be in the form of positive and negative motivators. For example, paychecks are positive motivators while punishments are negative motivators.

### 2.5.3 Motivation psychology

Motivation refers to psychological processes which are responsible for starting and continuing behaviours and is an important concept in education as well as in businesses and other areas.

There are many psychological studies related to motivation and far beyond the goal of this report. However, I would like to highlight a set of approaches, theories and models on which to base the gamified e-portfolio study.

**Incentive theory (extrinsic)** relies on giving an incentive or a motive to do something. The most common incentive is a reward, which can be tangible or intangible and presented after the occurrence of the action or behaviour that people are trying to correct or cause to happen again. The behavioural psychologist B.F. Skinner promoted incentive theory in his philosophy of Radical Behaviourism (Skinner 1974): a person's action always has social ramifications. If actions are positively (negatively) received, people are more (less) likely to continue to act in that manner. In this theory, stimuli "attract" a person towards them, and push them towards the stimulus. The process involves positive reinforcement: the reinforcing stimulus should make the person feel motivated to keep doing the activity they did.

Incentives can drive people to do certain actions, but they can also be used to get people to stop doing particular actions or tasks. Incentives only become powerful if the individual places importance on the reward. Rewards have to be obtainable to be motivating. For example, a student will not be motivated to earn a top grade in an exam if the assignment is so difficult that it is not realistically achievable.

The **Reinforcement Theory of Motivation** was proposed by Skinner and his associates which state that an individual's behaviour is a function of its consequences. It is based on Thorndike's "Law of Effect": an individual's behaviour with positive consequences tends to be repeated, but an individual's behaviour with negative consequences tends not to be repeated. However, this theory ignored the internal state of the individual (i.e. the inner feelings and drives of the individual). It

focuses totally on what happens to an individual when he takes some action and consists of:

- Positive reinforcement – giving a positive response when an individual show positive and desired behaviour;
- Negative reinforcement – rewarding the individual by removing negative/undesirable consequences;
- Punishment – applying undesirable effects for showing undesirable behaviour to lower the probability of repeating undesirable behaviour in future;
- Extinction – implies the absence of reinforcements or reducing the likelihood of undesired behaviour by removing reward for that kind of behaviour.

Next focus is on further behavioural studies related to motivation.

The **Fogg Behaviour Model** states that three things need to come together for a behaviour to occur:

- Motivation;
- Ability;
- Trigger (a cue).

When a behaviour does not occur, at least one of those three elements are missing. Based on Fogg's Behaviour Model (Figure 2.10), my research explores the effects of game elements as the trigger, and e-portfolio tasks as the achievable activities, to increase user motivation to use the e-portfolio application.



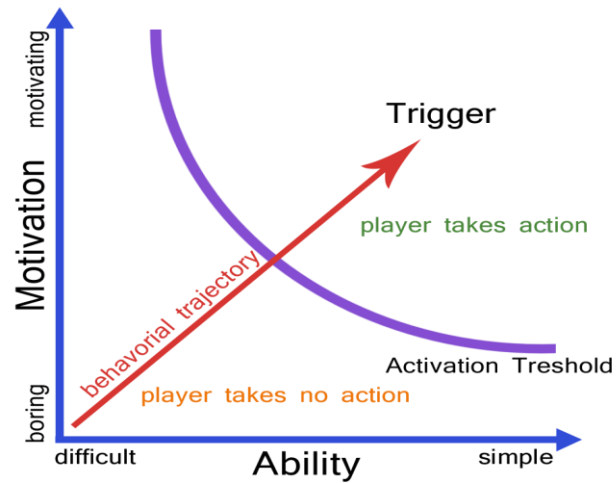
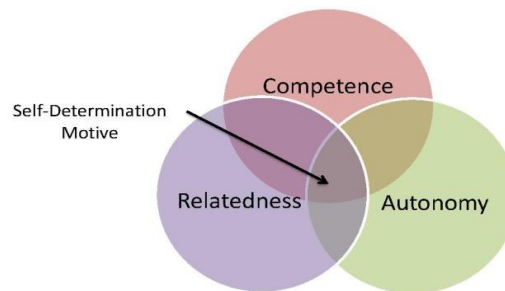


Figure 2.10: Fogg's Behaviour Model (Fogg 2009)

Three Innate Psychological Needs Comprise The Self-Determination Theory of Student Motivation



Source: Deci, E.L., & Ryan, R.M. (2000). The "What" and "Why" of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11, 227-268.

Figure 2.11: Self-determination theory (SDT)

**Self-determination Theory** divides motivation into two categories: extrinsic motivation and intrinsic motivation. The three primary psychological needs outlined by Ryan and Deci (Deci and Ryan 1985) in formulating the self-determination theory of motivation remains firstly autonomy, secondly relatedness and thirdly perceived competence (see Figure 2.11).

- Autonomy – the need to control the course of one’s lives which means having a sense of free will when doing something.
- Relatedness – the need to have a close and affectionate relationship with others which means the desire to interact with, connected to and experience caring for other people.
- Competence – the need to be effective in dealing with the environment, which means the desire to control and master the environment and outcome.

From these three basic psychological needs, Deci & Ryan (2000) further defined:

- Intrinsic motivation as “doing an activity for its inherent satisfactions rather than for some separable consequences”, and
- Extrinsic motivation as “a construct that pertains whenever an activity is done in order to attain some separable outcome.”

Deci and Ryan further stated that there are two types of motivation: autonomous and controlled:

- Autonomous motivation – when people are autonomously motivated (integrated a value of activity);
- Control motivation – when people do an activity due to external regulation.

Deci & Ryan (1985) then recognised that both autonomous and controlled motivations are comprised of factors of extrinsic and intrinsic motivation (Figure 2.12).

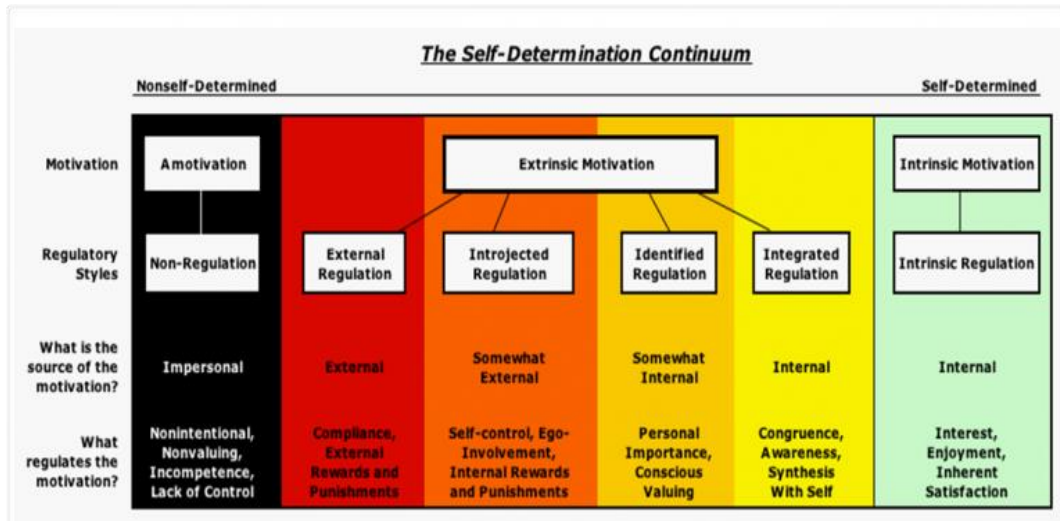


Figure 2.12: The Self-Determination Continuum (Deci and Ryan 2000)

## 2.6 Chapter Summary

This chapter presents the literature which forms a background to the research. It starts with a brief discussion on how ICT has influenced the teaching and learning activities with the emergence of new technologies to support the activities. The discussion continues to address how e-learning is considered as a popular learning approach in HEIs, followed by discussion about digital students, e-portfolios, gamification, and student engagement and motivation. The literature on e-portfolio include the definition, types of e-portfolio, e-portfolio in higher education, e-portfolio in Malaysia, e-portfolio framework and advantages and disadvantages of e-portfolio. The literature about gamification has been reviewed along with the definition of gamification, discussion about gamification in education, gamification principles and concept and advantages and disadvantages of gamification. The discussion was presented to show how gamification fits within the e-portfolio context of the research. All these factors contribute towards the development of the gamified e-portfolio framework that will be discussed later in this study (Chapter 5: Theoretical Framework). The next chapter will examine the research methodology for this study.

## Chapter 3

### Research Methodology

A research methodology signifies a way to efficiently solve a research problem. The overview of the various steps chosen in understanding the effect of gamified e-portfolios on user engagement and motivation along with the logic behind the methods employed during the study are important and are discussed. This chapter provides the overall methodological approach for investigating user engagement and motivation through gamified e-portfolios by groups of college students in Malaysia. The appropriate methodology has been carefully selected and developed based on the research problem and on the research objectives identified earlier in chapter 1 for the research questions to be answered. The methodology chapter clarifies the reasons for using a method or technique, so the results obtained can be assessed.

#### 3.1 Overview of the types of research and research design

What is research? Skilbeck (1983) had written about Lawrence Stenhouse's favorite view of research as "systematic inquiry made public". From our point of view, research can be defined as the systematic investigation into existing (expansion of past work in the field) or new knowledge. Research is often categorised according to the nature and purpose of the study and other attributes. Kumar (2008) has been categorising the types of research methods according to the nature of the investigation. From his point of view, research can be divided into the following two types.

- i. Descriptive research

Descriptive research usually involves surveys and studies that aim to identify the facts. It deals with the description of the state of affairs as it is at present, and there is no control over variables.

ii. Analytical research

Analytical research is fundamentally different because the researcher has to use available facts or information available and analyse these to make a critical evaluation of the material.

Besides that, Kumar (2008) also classifies the types of research methods based on the purpose of the study. These can be grouped into basic research and applied research.

i. Basic research

Basic research is exploratory in nature. It may add to the existing body of knowledge, and it is not necessary to provide results of immediate, practical use. However, it may provide a foundation for further, sometimes applied, research.

ii. Applied research

Applied research is to solve an immediate, specific practical problem. It is likely to be descriptive rather than exploratory, and most of the time is based on basic research.

The most general classification of types of research methods that are commonly used within the research community, and implicitly indicate the nature of research being undertaken and the kinds of assumptions being made, are the following.

i. Quantitative research

Quantitative study is a study design that emphasises the use of numerical, mathematical and statistical analysis of data collected through surveys, polls, experiments or questionnaires to analyse and explain social events and human behaviour. This approach uses postpositivist claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and tests of theories (Creswell 2003).

ii. Qualitative research

This is a study design that uses systematic observation and focuses on the meanings people give to their social actions. By using this approach, the investigator makes knowledge claims based on constructivist perspectives (i.e., the multiple meaning of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or pattern) or participatory aspects (i.e., political, issue-oriented, collaborative, or change-oriented) or both, and uses strategies such as narratives, phenomenologies, ethnographies, grounded theory studies, or case studies (Creswell 2003).

iii. Mixed methods research

Mixed methods research takes advantage of using multiple ways to explore a research problem. It is to overcome the limitations of a single design. The researcher bases their knowledge claims on pragmatic grounds (e.g., consequence-oriented, problem-centered, and pluralistic) and employs strategies that involve collecting data either simultaneously or sequentially to best understand research problems (Cresswell 2003).

Creswell (2003) in his study recognised the limitations of all methods, and thus felt that biases inherent in any single method could neutralise or cancel the biases of other methods. Thus, for this study, I based the inquiry on the assumption that collecting diverse types of data will best provide an understanding of my research problem of exploration of the effect of game elements in e-portfolio applications towards user motivation and engagement. My study begins with a survey to generalise results from groups of MARA vocational and professional students in Malaysia on gamified e-portfolios and then focuses on detailed qualitative interviews to collect detailed views from the participants.

### **3.2 Methodologies used in this research**

This research is a combination of computer science theories with theories drawn from education. The framework for gathering the research data is mixed mode and uses both quantitative and qualitative methods. The two methodologies are used in parallel to cross-validate and build upon each other's results. Using both research methods will help to "triangulate" one set of findings from one method of data collection gathered by the one methodology, with another very different set collected by the other methodology.

It is crucial to select suitable research methods to get accurate and reliable answers to the research questions. Figure 3.1 illustrates the research methods used to conduct the research.

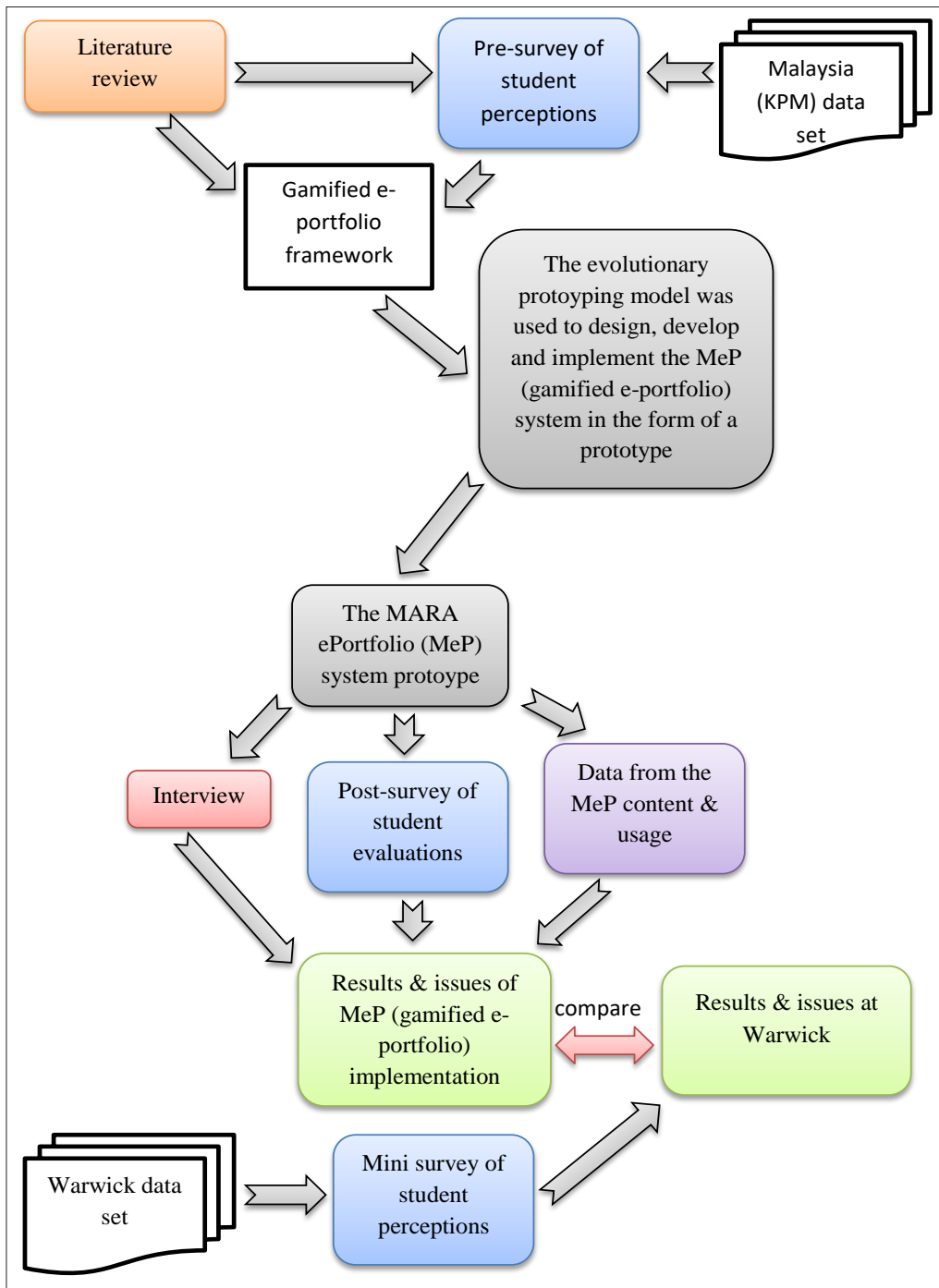


Figure 3.1: Research Methodologies

The thesis begins with a literature review of the past and current research in the primary research area. From the literature review, I developed a set of pre-survey questions to collect students' perceptions of the main focus of the research. Next, the results of the pre-survey and the literature review were used in developing the



gamified e-portfolio framework. This gamified e-portfolio framework was used as the basis for the gamified e-portfolio prototype development. The primary research data were then collected using a mixed methods approach using interviews, a post-survey of the students' evaluation of the gamified e-portfolio approach, together with the gamified e-portfolio content and usage of the application. The results of assessment and usage of the gamified e-portfolio system provide us with a view on how a gamified e-portfolio system could motivate and engage users based on the responses from the participants involved. This chapter presents the research methodologies of my research. The following sections will explain each method used in the research.

The data collection activities included online surveys, interviews, document observation and data from usage of the tool (which is the MARA ePortfolio (MeP) itself). Online surveys have been carried out in two phases (pre-survey and post-survey) in Kolej Profesional MARA (KPM), Malaysia and one mini-survey at the University of Warwick, United Kingdom. These quantitative data were from the MeP tool usage, while qualitative data have been collected through interviews. Other than that, document observations in the form of students' portfolio samples were also used. Participants were selected based on a voluntary basis for both methods.

However, due to the time constraints of the research duration, the implementation and evaluation phase could not be repeated. There are three surveys (pre-survey, post-survey, and Warwick mini survey) and interviews. The data collection activities were time-consuming processes. I started with the design process of the items (questions). Each item was carefully designed to meet the research objectives. Next, I proceed with getting approval from my supervisor followed by applying for the ethical consent approval from the Research Ethics & Governance Office (REGO), Warwick Medical School, University of Warwick together with the application of the ethical consent approval from MARA Higher Education Division. Upon getting the approval from all related parties, the data analysis of the surveys and transcribing the interviews were carried out. The development and implementation phase of the gamified e-portfolio system were the biggest challenges for me as a researcher as I develop it all by myself without any help from other people or outsource the work.

The data collection activities were done throughout a semester. This is because most of the students (participants) will change class and it would be very difficult to get the same group of students to evaluate the system again if the activities need to be continued the next semester. The introduction, demonstration and training activities of the MeP system need to be repeated for a new group of students and this would take longer. Please refer Appendix L for the research timeline.

Table 3.1 below is the mapping of the research questions to the data collection activities.

*Table 3.1: Mapping of research questions to data collection activities*

<b>Research questions #</b>	<b>Sub research questions #</b>	<b>Data collection activities</b>	<b>Data collection methods</b>
RQ 1	RQ 1.1 – 1.6	Pre-survey (online questionnaire) Mini survey (online questionnaire)	Quantitative Quantitative
RQ 2	RQ 2.1	Pre-survey (online questionnaire) Mini survey (online questionnaire)	Quantitative Quantitative
RQ 3	RQ 3.1 – 3.5	Post-survey (online questionnaire) Interviews	Quantitative Qualitative
RQ 4	RQ 4.1 – 4.4	Post-survey (online questionnaire) Interviews	Quantitative Qualitative
RQ 5 and 6	-	Interviews	Qualitative

For the first research question, the analysis was made by comparing different game mechanics/elements used in education and e-learning from a collection of research

papers on gamification in education, gamification in e-learning, and e-portfolios, together with the data collected from the pre-survey (for participants from KPM, Malaysia) and the mini survey (for participants from the University of Warwick). The analysis of the literature review and the results of the pre-survey were necessary to identify a suitable set of game elements that can be used to gamify the e-portfolio.

The second until fourth research questions, the analysis has been done by using the quantitative analysis technique (online survey) together with the data collected from the first research question. It was then supported by a qualitative analysis technique by interviewing consented participants (students).

The fifth and sixth research questions were based on the responses from the participants during the interviews.

The data was collected from two KPM institutions in Malaysia for the pre-survey and post-survey while the Warwick survey data was collected from the University of Warwick, United Kingdom. Currently, there is no e-portfolio application implemented in any of the MARA vocational and professional institutions. This means all KPM students have a very little to no experiences of using such application. For obvious reasons, it is impossible to survey all MARA vocational and professional institutions or even all TVET institutions in Malaysia. A sample of students from any of MARA vocational and professional institutions might represent the target population if the correct sample size is use. I used various methods to get enough respondents, but the voluntary nature of the data collection activities might limit the figure. Chances that the study could be replicated in other MARA vocational and professional institutions is possible because currently there is no e-portfolio application implemented in any of the MARA vocational and professional institutions. Similarly, it could be duplicated in other TVET institutions in Malaysia who do not have e-portfolio system and currently deploys a file-based portfolio encompassing students' paper-based learning materials and evidence. Eventhough there is a lot of weaknesses of this study, it can be a stepping stone to a more comprehensive exploration of the potential of gamified e-portfolio application. The drawn conclusions would be the first steps of more interesting possibilities and

opportunities for gamification in the e-portfolio system. Those who design and develop such applications might find the information from this study useful and for those who would like to implement an e-portfolio application in their institutions might get some insights of the required work that need to be done.

The mini survey (Warwick survey) was done at the University of Warwick to provide a slightly richer set of data which represent a sample of a higher education institution with e-portfolio application in place. This survey has been done to compare the user point of view of the e-portfolio application based on their experience using Warwick MyPortfolio and the possibility of applying game elements in the e-portfolio system. The reason why Warwick students do not use MeP is mainly due to time constraints. Furthermore, the MeP was designed and developed based on KPM students' preferences and it is a student-based presentation portfolio while Warwick MyPortfolio is an institution-based presentation portfolio. Therefore, MeP has not been tested by Warwick students. Table 3.2 shows the comparison of Warwick students and KPM students.

*Table 3.2: Warwick students vs KPM students*

<b>Warwick students</b>	<b>KPM students</b>
United Kingdom (developed country)	Malaysia (developing country)
Excellent facilities and infrastructure	Moderate facilities and infrastructure
Higher education institution (up to postgraduate level)	Vocational and professional institution (diploma level)
Students are diverse in nature (from across the globe)	100% local students (Malaysian)
Students are from variety income group.	80% of the students are from the low-income group.
Warwick have already implemented e-portfolio (MyPortfolio)	KPM have no e-portfolio
Entry requirements – high achievers from various academic level.	Entry requirements – minimum academic requirements after secondary school.

With these data, I hope that the research could be used and replicated in other TVET institutions in Malaysia. The results of this research can be generalised into a wider context, but further works are needed to customise and improve the research base on the selected higher education institution current settings, environment and requirements.

### **3.3 Quantitative Research Methods**

The aim of using this type of method was to get statistical data on the KPM students' opinions of the MeP regarding user engagement and motivation. The objective of using this approach was to find answers to the research questions and sub-questions of this study. The survey has been conducted in two phases: pre-survey and post-survey. The pre-survey online questionnaire aimed to gather information regarding students' demographics, the current infrastructure and facilities in KPM, their computer and Internet skills, and their perceptions of e-portfolios and computer games before they used the gamified e-portfolio. The post survey aimed to gather information on students' perceptions of using the developed gamified e-portfolios and games elements in the e-portfolio application. The survey questions have been carefully designed to answer the research questions, and ethical approval has been obtained from the University of Warwick Biomedical and Scientific Research Ethics Committee (BSREC) with BSREC reference REGO-2014-916. The survey questions have gone through a series of pilot testing to avoid misunderstanding and to ensure translation of questions did not accidentally introduce inconsistencies.

These questionnaires were distributed to KPMIM and KPMB students in Malaysia. Other KPM students were also encouraged to participate. The random selection is from the people that consented to participate in the surveys. Several methods have been used to get as many responses as possible like e-mail, face-to-face invitation through selected lecturers, and formal instructions from the administration. However, due to the voluntary nature of the surveys, I manage to get 174

respondents (students) from the pre-survey and only 51 respondents (students) from post-survey. The location of the researcher (UK) and the participants (Malaysia) might have an effect to the number of participations from the target population.

Other than that, a mini survey has been done at the University of Warwick to identify users' perceptions of the e-portfolio system at the University of Warwick (MyPortfolio) and gamification approaches (if applied to Warwick MyPortfolio) that can be used to motivate and engage users. The ethical approval has been obtained from the University of Warwick Biomedical and Scientific Research Ethics Committee (BSREC) with BSREC reference REGO-2016-1840. The statistical data gained from this survey will support the results obtained from the central part of the research to provide a richer set of data. The reason to include the Warwick mini survey is to make a comparison in terms of:

- current infrastructure and facilities in place that can support e-portfolio implementation;
- internet service accessibility, quality and affordance;
- devices used to access the internet;
- students' computer and internet skills;
- students' perceptions of e-portfolio implementation and usage;
- students' opinions of the gamification approach and gamified e-portfolio system.

These comparisons are intended to find out the similarities or differences between an institution which has not yet implemented the e-portfolio system (KPM, Malaysia) with an institution which has already implemented and used an e-portfolio system (Warwick University).

To get statistically significant results for the target population of MARA vocational and professional institutions, I used sample size calculator from the [www.checkmarket.com](http://www.checkmarket.com) website and calculate the sample size (Table 3.3) and the

margin of error (Table 3.4) based on the sample size. Below are the descriptions for each item used in the calculation.

- Population size – how many people are in the group of the sample.
- Number of respondents – the actual number of respondents that answered the survey.
- Confidence level - this tells you how sure you can be of the error of margin. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the margin of error.
- Margin of error - this is the plus-or-minus figure usually reported in newspaper or television opinion poll results. For example, if you use a margin of error of 4% and 47% percent of your sample picks an answer, you can be “sure” that if you had asked the question to the entire population, between 43% (47-4) and 51% (47+4) would have picked that answer.
- Required sample size – number of respondents needed.
- Estimated response rate - what percent of those asked to participate in the survey will do so. Response rates vary greatly depending on many factors including the distribution method (e-mail, paper, phone...), type of communication (B2C, B2B...), quality of the invitation, use of incentives, etc.
- Number to invite - This is the number of individuals out of the population you need to ask to participate, in order to achieve the required sample size based on the expected response rate.

*Table 3.3: Calculation of representative sample size for pre-survey, post-survey and Warwick mini survey*

	<b>Population size</b>	<b>Margin of error</b>	<b>Confidence level</b>	<b>Required sample size</b>	<b>Estimated response rate</b>	<b>Number to invite</b>
<b>Pre-survey</b>	400	2%	95%	343	20%	1715
<b>Post-survey</b>	174	2%	95%	120	20%	600
<b>Warwick mini survey</b>	25,000	2%	95%	2,191	20%	10,955

*Table 3.4: Calculation of sample size margin of error for pre-survey, post-survey and Warwick mini survey*

	<b>Population size</b>	<b>Number of respondents</b>	<b>Confidence level</b>	<b>Actual margin of error</b>
<b>Pre-survey</b>	400	174	95%	5.59%
<b>Post-survey</b>	174	51	95%	11.57%
<b>Warwick mini survey</b>	25,000	34	95%	16.8%

As sample sizes increase, survey results generally prove more reliable; hence, the margin of error becomes smaller. An "acceptable" margin of error used by survey researchers falls between 4% and 8% at the 95% confidence level. Therefore, the actual margin of error for the pre-survey (5.59%) is acceptable and will yield results reliable at the desired level. However, the post-survey and Warwick mini survey actual margin of error are higher than the acceptable margin of error (11.57% and 16.8%) due to the small number of respondents. To get a more reliable results, the interviews were conducted, and the interview findings were used to support the results from the post-survey.

### **3.4 Qualitative Research Methods**

Interviews have been conducted at the end of the implementation of MeP to get an in-depth understanding of findings from the questionnaires. Students from KPMIM and KPMB who had been using the gamified e-portfolio for 3 to 4 weeks were invited to take part in the interview. Only participants who give consent to be interviewed were randomly selected and called for the interview session.

### **3.5 Data Analysis Process**

After collecting data through a series of data collection activities using online questionnaires for quantitative data and both interview and portfolio samples for



qualitative data, the data were analysed. The following sections describe the process of interpreting the collected data.

### **3.5.1 Quantitative Data Analysis**

The quantitative data analysis for the primary data was done in two phases: pre-survey data analysis and post-survey data analysis for participants in KPM. The data collected from the mini-survey at the University of Warwick also used quantitative data analysis.

#### **Pre-survey Data Analysis**

The pre-survey was conducted to identify the readiness of KPM students for the use of e-portfolios and their perceptions of the game elements. This survey was carried out from 18<sup>th</sup> September 2014 to 21<sup>st</sup> October 2014 in three KPM colleges: KPMB, KPMIM, and KPMBM. The findings were based on online questionnaires of 174 students from the colleges aged 17 to 26. The students were from three different courses: Higher National Diploma in Computing (Software Development) (HND SD), Diploma in Computer Networking (DCN), and Diploma in Entrepreneurship (DEn). The questions were prepared in both English and Malay languages to ensure better understanding.

Aspects studied were (i) demographics, (ii) KPM students' styles in keeping and organising their learning materials or evidences, (iii) KPM students' prior experiences with the use of portfolio creation and development, (iv) KPM students' prior experiences in using technology, games application, and gamification, and (v) KPM students' initial perceptions towards integrating game elements in an e-portfolio. The approach used to collect the data was through an online questionnaire. The collected data were analysed using descriptive statistical analysis using SPSS 22 (Statistical Packages for the Social Sciences).

### **Post-survey Data Analysis**

The post-survey was conducted to get each student's perception and evaluation of the gamified e-portfolios and game elements in the application. This survey was carried out from 25th April 2016 to 9th May 2016 in KPMIM and KPMB. The findings were based on online questionnaires answered by 51 students from two courses: Higher National Diploma in Computing (System Development) (HND SYD), and Diploma in English Communication (DEC), who had been using the MARA ePortfolio (MeP). The questions were prepared in both English and Malay languages for better understanding.

Aspects studied were (i) demographics, (ii) MeP benefits, (iii) students' opinions of MeP, (iv) students' opinions of game elements in MeP, (v) KPM students' current experiences with portfolio creation and development, and (vi) students' evaluations in terms of engagement, motivation, learning, and usability of MeP. The approach used to collect the data was through online questionnaires.

The collected data were analysed using descriptive and correlation statistical analysis using SPSS 22.

### **Mini Survey Data Analysis**

The mini survey was conducted to identify user perceptions of the e-portfolio system at the University of Warwick (MyPortfolio) and the gamification approach if applied to Warwick MyPortfolio on user motivation and engagement. This survey was carried out between the 1<sup>st</sup> September 2016 and 1<sup>st</sup> November 2016 at the University of Warwick. The findings were based on offline and online questionnaires of 38 Warwick students. 30 students were picked randomly to answer the online survey, and eight students has volunteered to participate in the focus group sessions to answer the offline questions. The questions were prepared in English.

Aspects studied were: (i) background information, (ii) Internet access evaluation, (iii) computer skills evaluation, (iv) e-portfolio experiences, and (v) student

perceptions of games element if applied to the Warwick MyPortfolio. The approaches used to collect the data were through offline and online questionnaires. The collected data were analysed using a descriptive statistical analysis.

### **3.5.2 Qualitative Analysis Process**

Qualitative data analysis involves organising, accounting for and explaining the data (Cohen et al. 2011). There is no one single or correct way to analyse and present the qualitative data as they depend on the purpose of the research and the instruments used. As the purpose of this research is to explore the gamification approach in an e-portfolio application regarding user engagement and motivation, the presentation of the qualitative data was not focusing on individuals and responses from significant participants in the college, but the specific data were derived by summarising responses without necessarily identifying from whom.

The qualitative data collected for this research were based on the selected data collection activities which were the interviews. The data collected from the activities were analysed using content analysis due to their rich content and the need of categorization of the content. Content analysis is the process of summarising and reporting written data – the main contents of data and their messages (Cohen et al. 2011). It can be used with any written material such as documents, interview transcriptions, media products, and personal interviews, with categorization as an essential feature in reducing large quantities of data (Flick 2009).

The interviews were conducted to get a deeper understanding of each student's perceptions towards the game elements in the gamified e-portfolios and the application itself. These interviews were carried out between 6th April 2016 and 20th April 2016 in KPMIM and KPMB. The findings were based on open-ended questions answered by the students from two courses: Higher National Diploma in Computing (System Development) (HND SYD), and Diploma in English Communication (DEC). The interviews were conducted in Malay and audio

recorded. The transcription and analysis were done in Malay, and the results were translated into English after completion to maintain the consistency of the interpretation. The content analysis was performed in Malay before translating to English because it would give a more accurate analysis of the data. A precise understanding of each participant's responses was maintained with the use of Malay language from the beginning of the data collection process of interviewing the participants and transcribing the collected data to analysing the interview transcriptions. Finally, the results of the analysis were translated into English for the evaluation process.

The researcher conducted more than one interview. The analysis of the interviews was carried out afterwards using content analysis to describe user perception towards gamified e-portfolios.

### **Content analysis of qualitative data**

The interview data were transcribed accordingly by the researcher and reviewed to check whether the transcriptions are correct. Below is the process of doing the content analysis as illustrated in Figure 3.2.

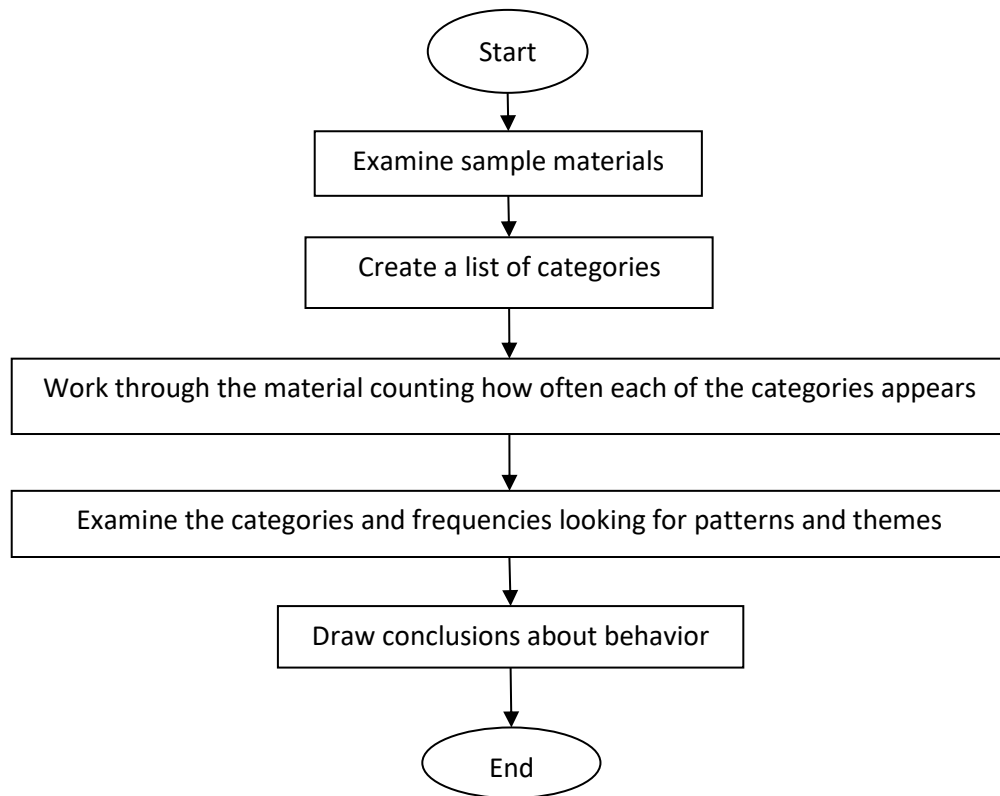


Figure 3.2: Content Analysis

*Step 1: Examine sample materials*

At first, the researcher transcribed the interview responses. Then, the researcher browsed quickly through all transcripts, made notes about the first impressions, and then read the transcripts carefully again to increase understanding.

*Step 2: Create a list of categories*

All relevant words, phrases, sentences or sections were listed. The list included anything about actions, activities, concepts, differences, opinions, processes or whatever else may be relevant. During this step, the researcher began a detailed analysis with a coding process. This analysis is required to organize the material into chunks or segments of text before bringing meaning to information.

*Step 3: Work through the material counting how often each of the categories appears*

In this step, I examined and work through the material counting how often each of the listed categories appears.

*Step 4: Examine the categories and frequencies looking for a patterns and themes.*

I continue from step 3 and examined the results and frequencies looking for a pattern. This will indicate how significant the categories are and identify the connections between them. The categories and the connections between the categories were the primary results of the study. It reveals new knowledge about the world, from the perspective of the participants in the study.

*Step 5: Draw conclusions about behavior.*

The description of the categories and how they are connected are presented and written in the results section, and in the interpretations and discussion of the results in the discussion section of this study.

### **3.6 The MARA ePortfolio (MeP) Software Development Process**

This research does not focus on the technical aspects of the software development. Therefore, I used an existing software development approach to guide us in the design and development process of the MeP system. System or software development methodology is "a standard process followed by an organization to conduct all the steps necessary to analyze, design, implement, and maintain information systems" (Hoffer et al. 2014). I reviewed some of the existing methods of software development in terms of the advantages and disadvantages of each methodology. Then, I choose a suitable method for our research.

### 3.6.1 Software Development Methods Review

i. *Waterfall model*

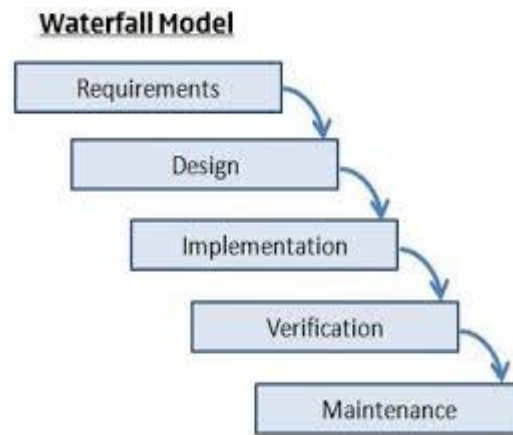


Figure 3.3: Waterfall model (adapted from Royce (1970))

The waterfall model was introduced by Dr. Winston W. Royce (Royce 1970) for a software development process. The waterfall model can be described as a formal top down method which includes independent phases that need to be done sequentially. This model can be used in varied ways such as combining the steps or with a different starting and ending points. Figure 3.3 illustrates the waterfall model which consists of phases that are completed sequentially before proceeding to the next phase. Once the waterfall model is followed, and if any step has been completed and the next step has been started in the development process, I cannot revert to the previous step to redevelop or perform any change. The phases of the waterfall model consist of requirements, design, implementation, verification, and maintenance. The advantages and disadvantages of waterfall model has been summarized in Table 3.5.

Table 3.5: Advantages and disadvantages of waterfall model

Advantages	Disadvantages
Easy to use and follow	Not suitable for large project
Cost effective	Less effective with unclear requirements at the beginning
Each phase completely developed	Difficult to move back and make changes on the previous phase
Development processed in sequential manner so very less chance to rework	Testing only starts once development completes (chances to have collective bugs to be found)
Easy to manage the project	High risk
Easy documentation	Less flexible

Therefore, we can say that the waterfall model can be used when the project is small, and the requirements are very clear.

ii. *Spiral model*

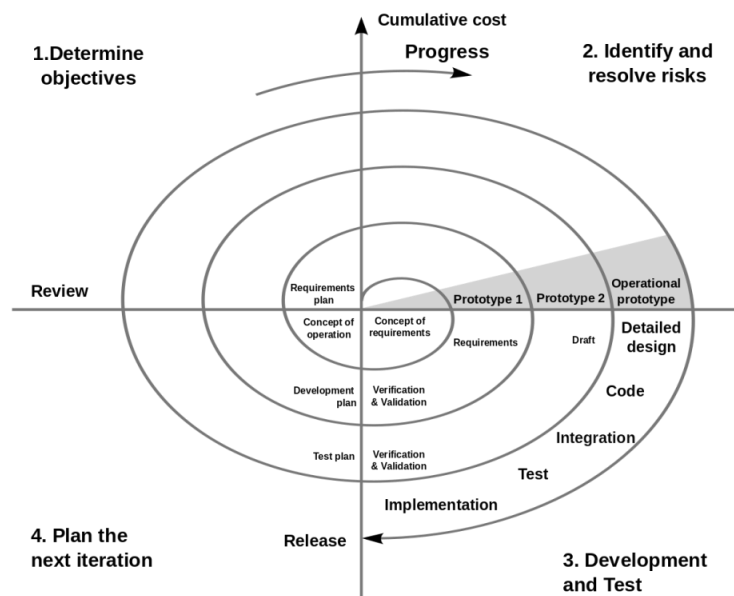


Figure 3.4: Spiral model (source from [https://en.wikipedia.org/wiki/Spiral\\_model](https://en.wikipedia.org/wiki/Spiral_model))



The spiral in Figure 3.4 model gives more emphasis on risk analysis. Each trip around the spiral traverses four basic phases: determine objectives, identify and resolve risks, development and test, and plan the next iteration. A software project repeatedly passes through these phases in iterations (called spirals in this model). The spiral model uses a well-defined structural approach for developing software (Chandra 2015). It is best suited for complex and mission critical projects. The advantages and disadvantages of spiral model has been summarized in Table 3.6 below.

*Table 3.6: Advantages and disadvantages of spiral model*

<b>Advantages</b>	<b>Disadvantages</b>
Software development is divided into smaller parts and risky parts	It is very complicated
Requirement change during development can be accepted	Goals must be well understood
Best for critical software development	Developers must be well qualified and experienced with this type of project
It uses more prototypes	

This model is suitable for projects that view the costs and risk evaluation as important, especially for medium to high-risk projects. It is also suitable for projects with complex requirements and unsure users (of what they need and want). Significant changes are expected (research and exploration) due to change of requirements.

iii. *Prototyping model*

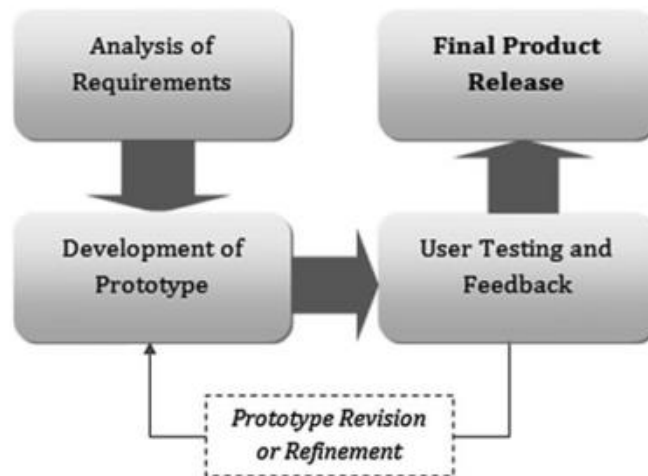


Figure 3.5: Prototyping model (adapted from Carr & Verner (1997))

The prototyping model (Figure 3.5) is an iterative framework that is based on the idea of creating the entirety or part of a system in a pilot version, called the prototype. The goal is ultimately to build in various versions and consistently refine those versions until a final product is reached (Carr and Verner 1997). It can be viewed as a process, either one that is part of the larger software development lifecycle (SDLC) or the central approach that defines the SDLC in terms of itself and emphasises the creation of software with less attention to documentation (Isaias and Issa 2015). The four different phases of the prototyping model are analysis requirement, development of a prototype, user testing and feedback, and product release. The working prototype of the product is implemented so that the user can test it and provide real-time feedback for the prototype to be improved. If changes and improvement are necessary, the prototype is revised and refined, and a new prototype will be released and implemented for testing. This sub-cycle goes on until the product is generally accepted by the users and no longer requires substantial changes or updates, at which time the final version is released (Carr and Verner 1997). The advantages

and disadvantages of the prototype model has been summarized in Table 3.7 below.

*Table 3.7: Advantages and disadvantages of prototype model*

<b>Advantages</b>	<b>Disadvantages</b>
Users are actively involved in the development.	Prototype model should be used when the desired system needs to have a lot of interaction with the end users
Since in this methodology a working model of the system is provided, the users get a better understanding of the system being developed	It is best suited for online systems with web interfaces that have a very high amount of interaction with end users
Errors can be detected much earlier	Prototyping ensures that the end users constantly work with the system and provide feedback which is incorporated in the prototype to result in a usable system
Quicker user feedback is available leading to better solutions	Good for designing a good human computer interface system
Missing functionality can be identified easily	Allows ease of use and needs minimal training for the end user
Confusing or difficult functions can be identified	

### 3.6.2 MeP Software Development Method

After reviewing the software development approaches and their properties as can be seen in Table 3.5, I decided to use an adapted prototyping model as it was the most appropriate model to use based on the characteristics of our MeP system:

- MeP is an online system with high user interactions (forums, blogs, comments features);
- It is exploratory in nature, the user requirements were not very clear at the beginning, and the feedback from the user (in an incremental manner) will be integrated into the next prototype release;
- The development team is small (a single developer only which is the researcher);
- There is a time limitation to develop the MeP system.

*Table 3.8: Comparison of the models*

Model properties	Waterfall model	Spiral model	Prototype model
Planning in early stage	Yes	Yes	No
Returning to an earlier phase	No	Yes	Yes
Handle Large-Project	Not Appropriate	Appropriate	Not Appropriate
Detailed Documentation	Necessary	Yes	Limited
Cost	Low	Expensive	Low
Requirement Specifications	Beginning	Beginning	Frequently changed
Flexibility to change	Difficult	Easy	Easy
User Involvement	Only at beginning	High	High

<b>Model properties</b>	<b>Waterfall model</b>	<b>Spiral model</b>	<b>Prototype model</b>
Maintenance	Least	Typical	Easily Maintained
Duration	Long	Long	Short
Overlapping Phases	No	No	Yes
Maintenance	Least maintainable	Yes	Easily maintainable
Re-usability	Least possible	To some extent	Yes
Time-Frame	Very Long	Long	Short
Working software availability	At the end of the life-cycle	At the end of every iteration	At the end of the prototype release
Team size	Large team	Large team	Small team

### **3.7 Conclusion**

This chapter explains the methodological approaches that were used to conduct the study and how I used them in my inquiry process of the research. The next chapter discusses in detail the initial study (pre-survey) that has been done.

## **Chapter 4**

### **Initial Study**

This chapter will present the initial study of the research. It is important to understand the intended users and existing infrastructure that are currently in place. These information will be useful in identifying the intended user requirements and to evaluate the possibility of embedding game-like features in the e-portfolio system in KPM, Malaysia. The initial study was conducted among students in three of the MARA HEIs: KPMB, KPMIM, and KPMBM. The study was important for the researcher to get the students' perceptions of e-portfolios and gamification and their preferred game elements for the e-portfolio system. KPM students' information such as demographics, computer and Internet skills, online patterns, access to computer and Internet, students' current styles in organising their learning material, students' prior experiences with portfolio creation and development, students' prior experiences in using games application, and their current knowledge of 'gamification', have been collected. The collected data provide useful information and will be used as input to develop the gamified e-portfolio framework and system prototype.

#### **4.1 Introduction**

E-portfolios and gamification are still considered new in Malaysia HEIs and have not been widely applied and accepted compared to the HEIs in European countries. Many considerations must be considered when an institution decides to implement an e-portfolio system. One of the most crucial questions that the decision makers need to ask themselves is regarding the technology that they want to use. Would the current technology and infrastructure be enough for the e-portfolio implementation to take place or do we need to invest in a new technology or improve the current infrastructure to make the e-portfolio implementation successful? Most HEIs in Malaysia will opt for the first option which is using existing

infrastructure and tools as it is the most economical and preferred solution especially in most MARA HEIs. I also believe that if given the options, most Higher Education Institutions in the world would prefer to use their current infrastructure and technology in place since any upgrades or any new technology acquisitions would cost the institutions a lot of money. Students' technology affordance and ICT skills also need to be evaluated. If the students' ICT skills and technology affordance is below the acceptable level of the implementation of new system, there is the possibility that the e-portfolio implementation would face a problem. Therefore, the first step is to evaluate student readiness in terms of technology affordance and skills as well as the institution's current infrastructure and facilities to ensure the implementation of the e-portfolio system possible. Other than that, there is the need to get students' perceptions on the e-portfolio systems and gamification of the system. This information will contribute to the smooth sailing of the gamified e-portfolio implementation. Therefore, the preliminary survey is necessary for the research.

#### **4.2 About the Pre-Survey**

The overarching questions for this section to be answered are:

**Research question 1: *Do the current infrastructure and facilities support the use of an e-portfolio system in the institution?***

RQ 1.1 Do students have access to the Internet?

RQ 1.2 Do students have suitable devices to connect to the Internet?

RQ 1.3 Do students have acceptable Internet skills?

RQ 1.4 Do students have acceptable computer skills?

RQ 1.5 Are the Internet services used by the students satisfactory?

RQ 1.6 How frequently do the students use the Internet?

## **Research question 2: What is suitable game mechanics for an e-portfolio system?**

RQ 2.1 What type of game elements do students prefer?

To answer these questions, the online questionnaires were found to be the most suitable method to collect the required data. The reasons why I choose online questionnaires are as follows:

- The participants are higher education institution students that have access to the Internet.
- Participants can answer the questions during their free time, but follow-ups are required to remind them to answer the questions.
- Furthermore, the researcher's location and participants' location are too far to consider distributing and collecting the questionnaires by hand (UK and Malaysia).

### **4.2.1 Aims and Objectives**

The aims of the pre-survey were to find out the demographic information of the users, users' computer and Internet skills, existing infrastructure that is currently in place, users' technology affordances, users' initial perceptions of portfolios, e-portfolios application gamification, and game elements that they think can be used to motivate and engage users with the e-portfolios application.

The objectives of the pre-survey include:

- collecting demographics information;
- finding out the users' computer and Internet skills level;
- finding out existing infrastructure that is currently in place;
- finding out users' technology affordances;



- getting users' perceptions towards e-portfolios, e-portfolio applications, gamification, and game elements that the user think can be used to motivate and engage users to the e-portfolio application.

## **4.2.2 Methodology**

I have discussed in detail the framework for gathering the research data in the previous chapter which was a mixed methods approach that includes qualitative and quantitative research methods. As discussed in chapter 3, the quantitative research methods include online questionnaires, and these questionnaires have been carried out in two phases: pre-survey and post-survey. This section will describe in detail how the selected research methods has been used to gather the required data. The results have been used to address the first and second research questions of the study. I used descriptive analysis to analyse the results of the findings.

### **4.2.2.1 Validation**

Content validity refers to the extent to which the items on a measure assess the same content or how well the content material was sampled in the measure (Rubio et al. 2003). The pre-survey online questionnaire was initially sent to two PhD candidates in the Computer Science Department at Warwick University and two representatives (lecturer and student) from KPM to test the readability and understanding of the questions. The contents validation activity was applied to confirm the suitability of the content to the objectives of the pre-survey and give their opinion about whether the question is essential, useful or irrelevant to measuring the construct under study. After validation, some minor modifications and alterations in the questions' structure, wordings and contents related to the pre-survey objectives were made.

#### **4.2.2.2 Participants**

This preliminary survey has been conducted in three of the MARA Higher Education Institutions: KPMB, KPMIM, and KPMBM. These findings are based on an online pre-survey of 174 students, aged 17 to 26, from three different colleges and from three different courses which are the Higher National Diploma in Computing (Software Development) (HND SD), Diploma in Computer Networking (DCN), and Diploma in Entrepreneurship (DEn). It was conducted from 18th September 2014 to 21st October 2014. The online survey was prepared both in English, and Malay languages for a better understanding of question asked in the survey.

#### **4.2.2.3 Pre-survey Design**

The pre-survey begins with an introductory page about the e-portfolio surveys, and the participation was voluntary. The responses are remaining strictly confidential. The questionnaire was divided into four sections.

##### **A. Demographics.**

This section was designed to collect the demographics data covering age, college name, course registered, the semester of study and gender. The data on the reliability of the Internet connection, the Internet connection speed, who paid for the Internet access, ease of use using computers to archive and organise learning materials, satisfaction with one's Internet skills, and does the Internet service restrict the way student use the Internet, were also collected.

##### **B. Students' current style in archiving and organising their learning materials.**

This section consisted of ten items and was designed to collect data about whether the students keep their learning materials for future use or not and in what form, had their learning materials ever gone missing or been

damaged, students' sharing preferences and students' feedback preferences.

**C. Prior experiences with e-portfolio creation and development.**

This section has seven items. It was designed to collect data about students' familiarity with the e-portfolio concept and what e-portfolio means, whether the students have had any portfolio before and how frequent they are updating it and finally, the students' preferences for the e-portfolio content.

**D. Prior experiences in technology, game applications, gamification and perception towards game elements.**

This section had nine items and was designed to collect data about students' opinions about the Internet in teaching and learning process, students' opinions on computer roles in completing the assignment, do they like to play computer games, and the game elements that the students preferred.

Upon submitting their responses, the respondents were considered have agreed to participate in the survey. At the end of the online questionnaire, I included a consent form for the respondents who would like to participate in the interview.

### **4.3 Pre-survey Findings**

To implement an e-portfolio in KPM, it is beneficial to investigate the background of the users and the institution itself. In this section, the demographics results of the users from the three selected MARA Higher Education Institutions (KPMB, KPMIM, KPMBM) for three different courses (DCN, HND SD, DEn) will be described. The reason to collect this data is to add on the researcher's understanding of the characteristics of the target population in terms of their computer skills, Internet

skills, devices used to access the Internet, current Internet services that the student use (quality, speed, reliability, accessibility, affordability), and also the location they usually access the Internet. Most of the data collected are categorical data and have been grouped according to some common properties like gender. The numbers of members of the groups are carefully recorded.

#### 4.3.1 Demographics

##### Age

A total of 174 respondents participated in the online pre-survey. The range of the participants' ages was between 17 and 26. Measures of central tendency were computed to summarise the data for the age variable. Measures of dispersion were computed to understand the variability of scores for the age variable. The mean value is 19.42, and the standard deviation is 1.407. Based on the mean value, it appears that most students in the class were of traditional college age in Malaysia (usually between the ages of 17 to 30 years old), which is common. However, based on the small standard deviation, it looks like the ages do not vary.

##### Gender

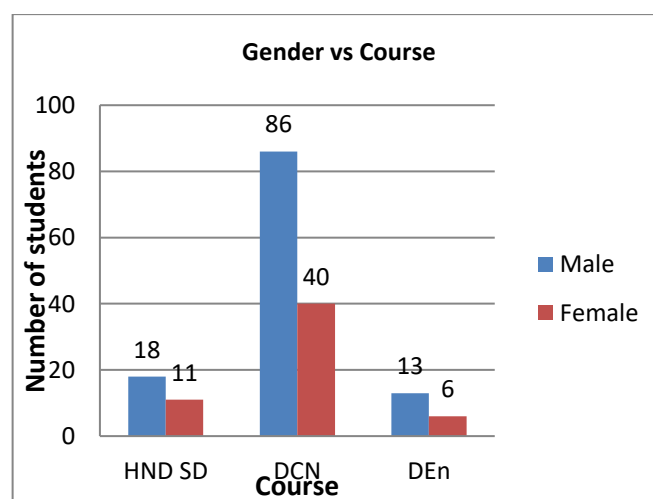


Figure 4.1: Gender vs. Course

The above figure (Figure 4.1) shows the distribution of male and female students for every course offered (HND SD, DCN, DEn). It is obvious there are more male students (62%) than female students (38%) in the target population.

### Internet Skills

*Table 4.1: Internet usage duration, frequency, and Internet skills satisfaction*

Items	In percentage (%), n=174		
	KPMB (n=29)	KPMIM (n=126)	KPMBM (n=19)
<i>How long have you been using the Internet?</i>			
Less than 6 months	3.45	3.17	5.26
6 months to less than 1 year	0	0	5.26
1 year to less than 3 years	6.90	10.32	15.79
3 years to less than 5 years	0	31.75	21.05
5 years and more	89.66	54.76	52.63
<i>How often do you use the Internet?</i>			
Occasionally	3.45	8.73	5.26
Monthly	0	2.38	5.26
Weekly	3.45	6.35	0
Daily	93.10	82.54	89.47
<i>How satisfied are you with your Internet skills?</i>			
Very satisfied – I can do everything that I want to do	24.14	27.78	63.16
Satisfied - I can do most of the things that I want to do	51.72	54.76	31.58
Neither satisfied nor unsatisfied	20.69	13.49	0
Unsatisfied - I can't do many things that I want to do	3.45	3.97	0
Very unsatisfied - I can't do most of the things that I want to do	0	0	5.26

In Table 4.1, most of the students had been using the Internet for five years or more and used it daily. This duration of Internet usage shows the students have spend time online doing various activities and this suggest they use the Internet regularly. Most of the participants have been using the Internet from secondary school but there are also participants who were just learning to use the Internet.

Many of the students said that they were satisfied or very satisfied with their Internet skills, and these responses give a good indicator of the students' level of

Internet skills to the researcher and the institution’s decision makers. However, we need to be careful because there are chances that competent people underestimate their skills, and incompetent people overestimate them. This is known as the Dunning-Kruger effect (Kruger and Dunning, 1999). The first two questions to evaluate Internet usage duration and frequency of using it would balance the possibility of participants underestimating or overestimating their Internet skills. Further discussion on this is beyond the scope of the research.

HND SD students used the Internet daily compared to DCN students weekly and DEn students monthly, as illustrated in Figure 4.2. HND SD and DCN are computer-based courses while DEn is an entrepreneurial course so the usage of Internet between different courses may have link with their course works. HND SD is a software development program while DCN is a networking program so students from both courses need to do some programming and do their assessments using computers.

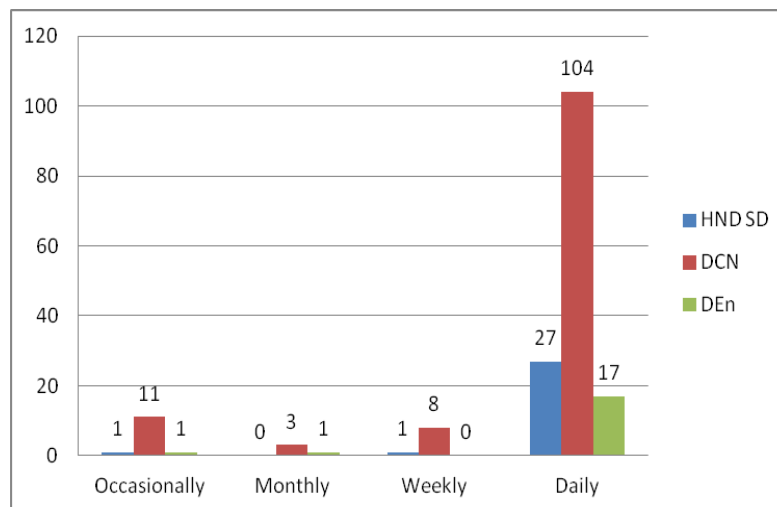


Figure 4.2: Frequency using the Internet by course (n=174)

### Computer Skills

The ease of use of the computer by course bar chart (Figure 4.3) depicts how comfortable students feel using computers. By looking at the chart, we can see most of the students in each group feel comfortable or very comfortable using a computer. The comfortable feeling of the users in using the computer imply that

most of the students can use computer. This chart also suggests that the students had been using the computer for quite some time and very familiar with the technology. Only a small number of students were uncomfortable with computers.

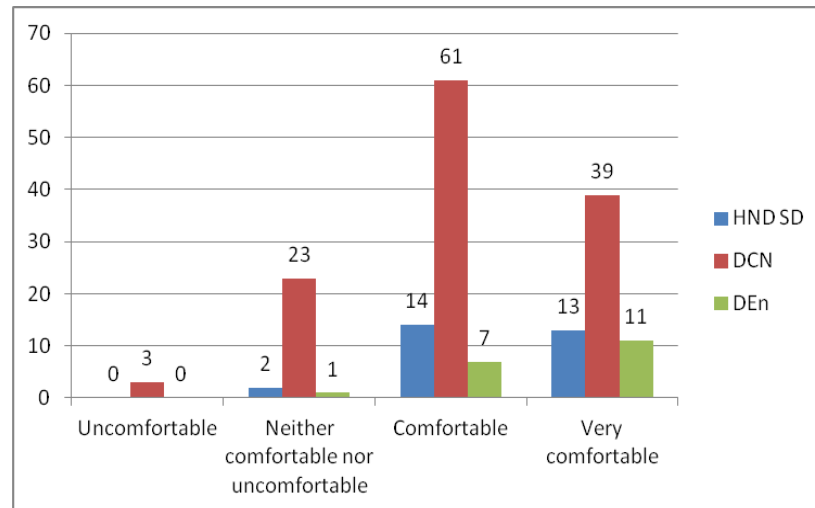


Figure 4.3: Ease of use of computer by course (n=174)

The higher Internet skills satisfaction is not a surprising result because these students have been using the Internet for quite some time (3 years and more). These results suggest the students have acceptable computer and Internet experiences and this might help in terms of e-portfolio application implementation.

#### Device used to access the Internet

Figure 4.4 show devices used by students to access the Internet. The top three used devices to access the Internet were smartphones (35.4%) followed by laptops (34.2%) and desktop computers (22.4%). More than 60% of the devices are mobile devices (smartphones and laptops). This suggest students were using different type of devices to access the Internet. This information is useful to assist in the decision making process of which platform that need to be used for the e-portfolio system.

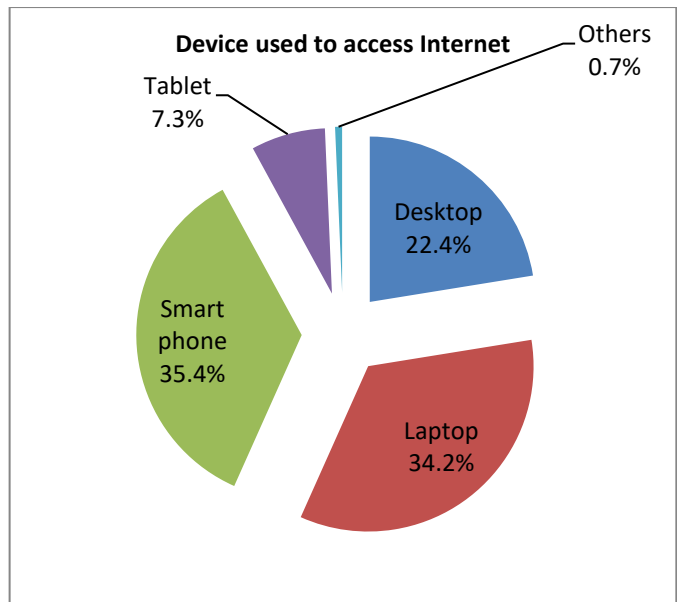


Figure 4.4: Device used to access the Internet

#### Location Accessing the Internet

Table 4.2 shows the distribution of locations where students usually access the Internet. As we can see, most of the students usually access the Internet from home and college (94.24%). This suggests that the students access the Internet more from their college and home. Only a small number of students access the Internet from public terminals and cyber cafés (5.76%).

*Table 4.2: Location accessing the Internet*

Where students usually access the Internet			
Home	College	Cyber Cafe	Public Terminal
163	148	3	16
(49.39%)	(44.85%)	(0.91%)	(4.85%)

#### Internet Services

Figure 4.5 shows there is a variance of Internet speed that the students currently use. More than half of the students said their Internet speed changed from time to time (77%), with a range of connections, some of which dropped frequently, some of which were reliable. This imply that the reliability of the Internet speed and



services could sometimes limit their access to the system. Further investigation needed to make sure that the limitation of the internet services would not restrict them from using the system (refer Table 4.4).

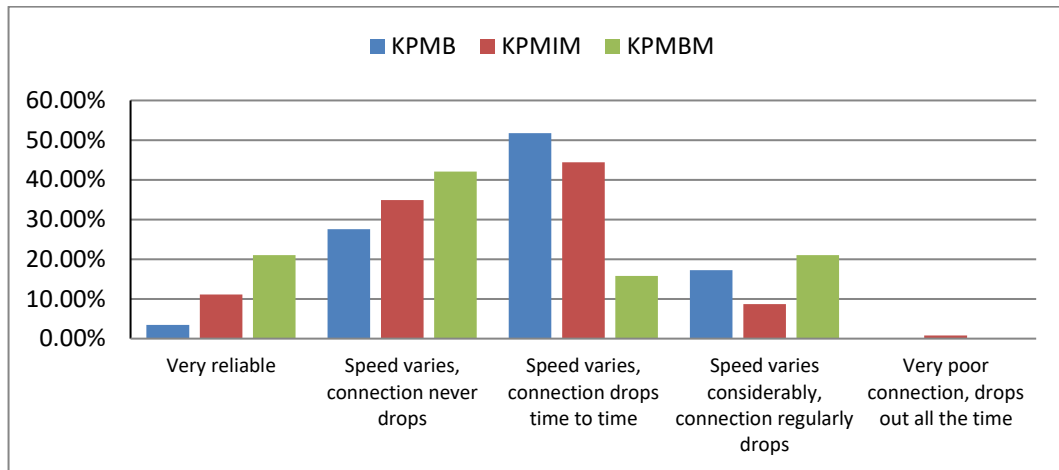


Figure 4.5: Internet speed

Table 4.3: Who pays for the Internet access?

Who pays for the Internet access?			
Student	Parent	School	Others
144 (59.02%)	80 (32.79%)	17 (6.97%)	3 (1.23%)

Figures in Table 4.3 show the person who pays for the student Internet access. Most of the students pay for themselves (59.02%). This figure indicates the Internet fee is mostly paid by the students themselves. Otherwise, the Internet services would be paid by their parents (32.79%) followed by school and others. This data suggest that many students are willing to pay for their Internet services.

*Table 4.4: Internet service restrictions versus connection speed*

Item		Q7. Your Internet connection speed					
		Very slow	Slow	Acceptable	Good	Excellent	Total
Q11. Current Internet services restrict the use of the Internet	Yes, it restricts my ability to use the Internet for basic functions	3	1	1	1	0	6
	Yes, it restricts my ability to use some Internet applications and services	3	14	32	10	0	59
	No, it does not restrict the way I use the Internet	6	17	48	36	2	109
Total		12	32	81	47	2	174

Table 4.4 shows student Internet connection speed evaluation and current Internet service performance. 74.71% of the students agree that their current Internet service does not restrict the way they use the Internet while more than half of the students (62%) agree that their Internet connection speed ranges from acceptable to excellent level. This means the students do have acceptable Internet services at the college and their home.

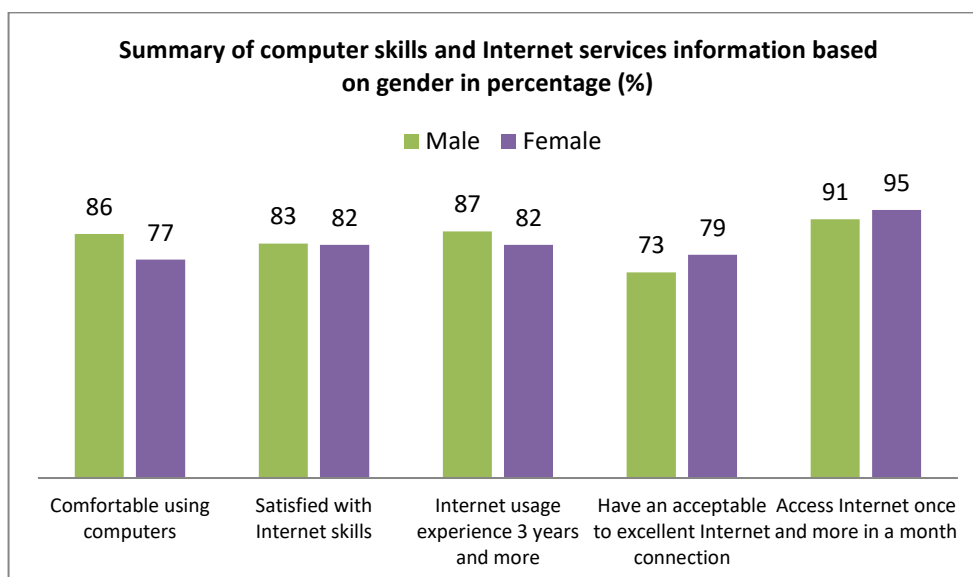


Figure 4.6: Summary of computer skills and Internet services information based on gender in percentage (%)

Figure 4.6 summarises participants' computer skills and Internet services information. Overall, there was no significant differences in the number of male and female students regarding their computer and Internet skills and usage which suggested both genders had good computer and Internet skills and usage (70% and more for each item).

From these results, we can say that the target users were comfortable using computers and had acceptable Internet skills and experiences. Furthermore, they had acceptable Internet connections and did access the Internet regularly.

### 4.3.2 Students' Current Styles in Archiving and Organising Their Learning Materials

#### Keeping Learning Materials/Artefacts

*Table 4.5: Course (Kursus) versus Keep artefacts*

		Q12. Keep artefacts			Total
		No	Yes	Yes but selected items only	
Course (Kursus)	HND SD	2	13	14	29
	DCN	3	58	65	126
	DEn	0	12	7	19
Total		5	83	86	174

Based on Table 4.5 on keeping learning materials or artefacts by course, most of the students do keep their learning materials in general or selectively. This means students do treasure their learning materials and would like to keep them safe. There are no significant differences between keeping any materials or just selected materials which means, all materials are valuable to the students.

### Keeping Learning Materials/Artefacts in a File

Learning materials as defined by many participants in this research refers to any coursework materials in the form of notes, handouts, assignments, exercises and such. Three of the interview participants mentioned about keeping their notes and assignments in a file (paper-based) while two of the interview participants just keep their notes and handouts in their textbooks. There are also participants who mentioned that they keep a soft copy of their learning materials like pictures, a snapshot of their work, or a word file in their computers or laptops or in the cloud storage (Google drive, Dropbox). Most of the students (91%) admitted that they kept their learning materials properly (in a file – paper-based and/or electronically) as presented in Table 4.6 below.

*Table 4.6: Course (Kursus) versus Keep artefacts in a file*

		Q13. Keep artefacts in a file		Total
		No	Yes	
Course (Kursus)	HND SD	2	27	29
	DCN	10	116	126
	DEn	3	16	19
Total		15	159	174

*Table 4.7: Students' responses in referring to their previous work and keeping their learning materials*

No.	Item	Student Response (%)	
		Yes	No
1	Do you refer to your previous work to complete the new task?	95.40	4.60
2	Do you keep your learning materials for future use?	91.95	8.05

Based on Table 4.7, nearly all the students (95.4%) would like to refer to their previous work to complete new tasks. This learning style gave them guidance through previous work and gave them confidence in producing a new one. The next question result also shows a similar figure which shows that most of the students

(91.95%) would like to keep their learning materials for future use. This suggests how the students value the work they produced and like to refer to their previous work to complete a new task or assignment.

Table 4.8 suggests most students agree that some of their artefacts have gone missing. It such a great loss to the students of the missing completed work because they could not share their work with others or refer to their work in the future. With e-portfolio applications, they can save it digitally and share it. An electronic version of their work gives them option to keep it in the cloud alongside the hard copy of the materials. They can also make duplicate copies of their work for a backup purposes and this could potentially reduce the problem of missing artefacts. Other than that, at the end of their studies, they can transfer the soft copy to their own cloud storage for future references.

*Table 4.8: Course (Kursus) versus Artefacts gone missing*

		Q14. Artefacts gone missing		Total
		No	Yes	
Course (Kursus)	HND SD	2	27	29
	DCN	29	97	126
	DEn	4	15	19
Total		35	139	174

#### Student sharing style or sharing preferences

*Table 4.9: Students sharing preference of their learning materials*

No.	Item	Student Response (%)	
		Yes	No
1	Do you ever share your learning materials/artefacts with others?	92.53	7.47
2	Do you like to share your work with others?	87.36	12.64
3	Do you like your friends to share their work with you?	89.66	10.34

The figures in the Table 4.9 suggest that most of the students do share, like to share and like their friends to share their learning materials. It is not surprising because there are tasks that need to be done individually or as a groupwork which require them to share their learning materials with their friends. Their willingness to share their work with others on their completed work show the extent to which an individual has a strong internal drive to communicate their individual intellectual capital to others. This shows a balanced sharing style that can contribute to better access to information and knowledge sharing among the students. As mention by (Hooff, Bart & Hendrix 2019), the students may have been predisposed to sharing their knowledge freely because knowledge sharing is a normal activity among people involved in various academic pursuits due to the need for co-operation and mutual benefit. However, two interview participants did mention about their concern of plagiarism and will only share if their friends shared their works. Plagiarism in e-learning is quite an issue nowadays. Although plagiarism is beyond the scope of discussion for this research, in e-portfolio, student is the owner of their portfolio. Therefore, the decision to share their learning materials is based on their judgement and consideration. Furthermore, many higher education institutions are using various techniques and services that are available to check for plagiarism such as: CopyCatch: [www.copycatchgold.com](http://www.copycatchgold.com), TurnItIn: [www.turnitin.com](http://www.turnitin.com), MyDropBox: [www.mydropbox.com](http://www.mydropbox.com), Eve: [www.canexus.com](http://www.canexus.com), Plagiarism.com: [www.plagiarism.com](http://www.plagiarism.com), Jplag: [www.jplag.de](http://www.jplag.de), Copyscape: [www.copyscape.com](http://www.copyscape.com), and many more.

## Student feedback preferences

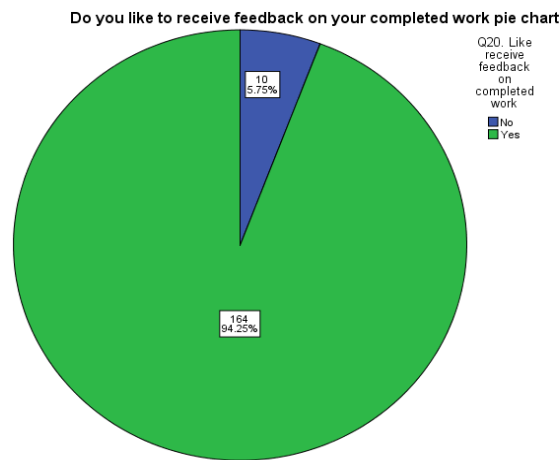


Figure 4.7: Feedback on completed work pie chart

Most of the students like to receive feedback on their completed work (94.25%). The students valued the given feedback and suggested that the feedback feature would be the most valuable feature in the e-portfolio application if it is to be implemented.

Based on Figure 4.8, most of the students (106 out of 174 students) like to receive feedback from their peers and lecturers compared to peers only, lecturers only or family only. This shows student trust their lecturers and friends to give feedback on their completed work and value the feedback highly. Family in this context refers to the parents or any blood relation relatives of the students like uncle/aunt/sister/brother or official guardian who is responsible to take care of the students. The reason to include feedback from family is to motivate students through parental involvement in students' education and learning as stated in the original theoretical framework of multivariate model of parental involvement by Hoover-Dempsey and Sandler (1995), supported by a study from Lavenda (2011). Other than that, Gonzalez-Dehass et al. (2005) uncovered that when parents are involved, students report more effort, concentration, and attention, more interested in learning, and they experience higher perceived competence. A study

by Mo and Singh (2008) also confirmed the importance and significance of parents' involvement in middle school students' school engagement and performance. Newer studies that support parental involvement are by Pavalache-Ilie and Jîrdia (2015) and Boonk et al. (2018).

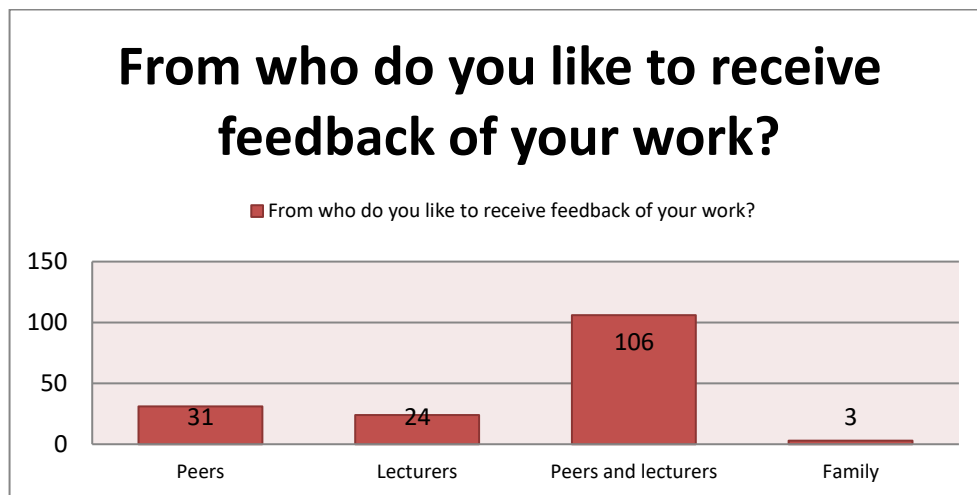


Figure 4.8: Preferred people to give feedback to student's artefacts

### 4.3.3 Prior Experiences with E-portfolio Creation and Development

Table 4.10: Students' prior knowledge and experience of e-portfolios

No.	Item	Student Response (%)		
		Yes	Yes through given text	No
1	I have already heard of the "e-portfolio" concept	58.05		41.95
2	I already know what "e-portfolio" means	15.52	52.3	32.18
3	I already know what should be included in an e-portfolio	13.22	51.72	35.06
4	I have already had a paper-based portfolio of my learning experiences	45.98		54.02
5	I spend at least 1 hour to update my portfolio daily	57.5		42.5



Based on Table 4.10, roughly half of students know what an e-portfolio is. This is because nearly half of the students already have a paper-based portfolio of their learning experiences. 57.5% of the students who already have a paper-based portfolio spend at least 1 hour daily updating their portfolio.

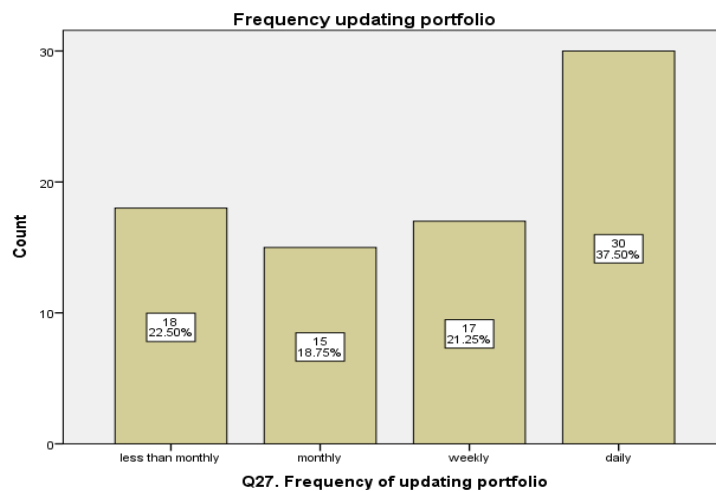


Figure 4.9: Frequency of updating portfolio

This bar chart shows many students update their portfolio daily (37.50%) while the frequency of updating weekly, monthly, and less than monthly are equal (between 18% to 23%). The result from Figure 4.9 support the findings from Table 4.10 in the previous page that students who already have a paper-based portfolio spend at least 1 hour daily updating their portfolio, that means they visited and revised their portfolio daily for various reasons.

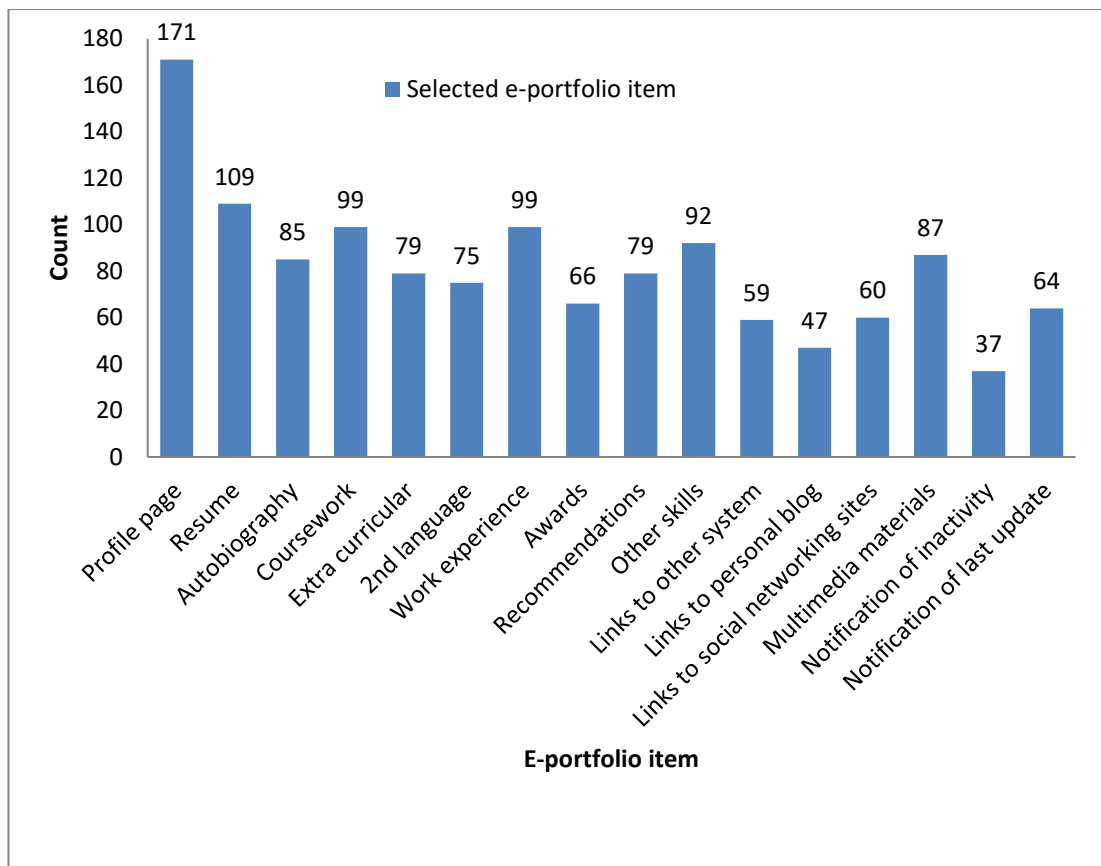


Figure 4.10: Preferred e-portfolio item

Based on the student portfolio item selection in Table 4.10, the profile page is the most selected item that they like to be included in an e-portfolio, followed by resume, coursework, work experience, other skills, and multimedia materials that are selected on the profile page. Other than that, autobiography, extra-curricular, second language, and recommendations are also considered important as e-portfolio content. The least selected items are awards, notification of the last update, link to social networking sites, link to other systems, link to the personal blog, and notification of inactivity. Students can choose more than one item that they prefer. The list of the portfolio items was based on Lorenzo and Ittelson ( 2005) six major contents of e-portfolio: plan educational programs, document knowledge, skills, abilities, and learning, track development within a program, find employment, evaluate a course, monitor and evaluate performance and with currently available and well-known e-portfolio systems like Mahara, FolioSpaces and Edmodo. Other than that, it was based on the previous discussion in section 2.3 Types of e-portfolio

and section 2.4 E-portfolio implementation in higher education in chapter 2, together with researcher's objective to design a student-based presentation e-portfolio with game elements.

#### 4.3.4 Prior Experiences in Technology, Games Application, Gamification, and Perceptions Towards Game Elements

*Table 4.11: Students' perceptions and prior experiences of Internet, computers, computer games, gamification, and gamification in education*

No.	Item	Student Response (%)	
		Yes	No
1	Do you think that the Internet plays a vital role in teaching and learning process?	99.43	0.57
2	Do you think computers play an important role in completing the assignment?	99.43	0.57
3	Do you like to play computer games?	87.93	12.07
4	I spend more than 1 hour daily playing computer games.	62.64	37.36
5	I have already heard of "gamification" concept	50.57	49.43
6	I think that games are the same as gamification	68.97	31.03
7	I have already heard of gamification in education	47.7	52.3
8	I know what game elements and game dynamics are	55.75	44.25

Based on the Table 4.11, there is no doubt that students think the Internet and computers play a vital role in teaching and learning and in completing their assignments. 87.93% of the students like to play computer games. This shows the students are comfortable with gameplay elements and applications. However, there is a misconception of a game and gamification from the student point of view. It is based on the figures in Table 4.11 that shows more than half of the students think that games are the same as gamification even though nearly half of the students said they already heard of gamification in education and half of the students said they know what game elements and game dynamics are. This tells us that the

students don't understand the differences between games and gamification, and this would be interesting to be explored in the future work.

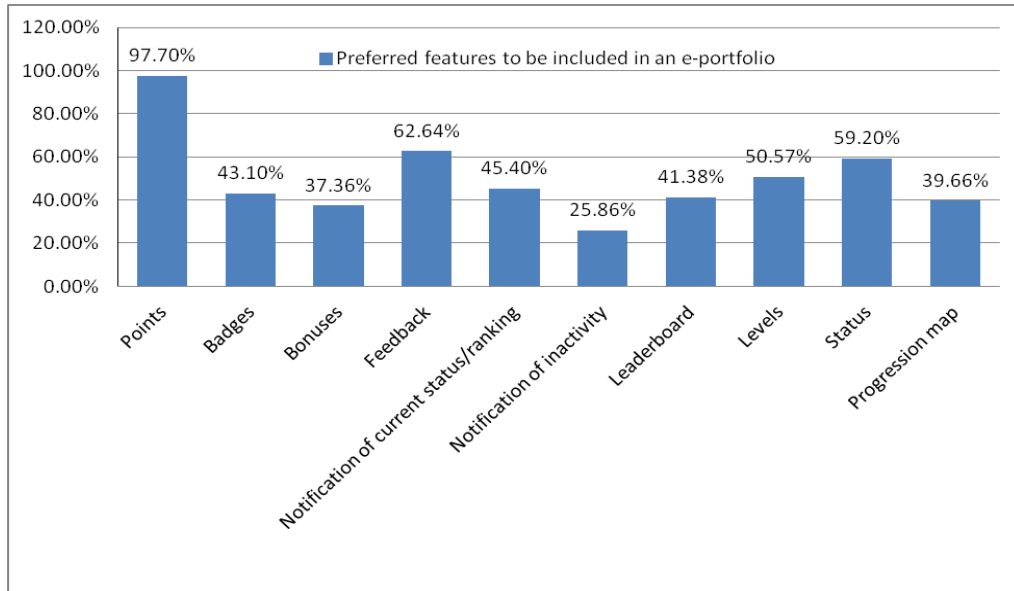


Figure 4.11: Preferred e-portfolio features

Based on the bar chart above, the preferred features to be included in e-portfolios are points followed by feedback, status, and levels. Badges, notification of current status/ranking, and levels are equal while bonuses, progression maps, and notifications of inactivity are the least selected features. Many people like receiving points because it shows their level of achievement and motivates them to collect more.

#### 4.4 Discussion

This preliminary study was conducted to get the KPM students' perceptions of the implementation of e-portfolios and understanding the target users' preferences for the e-portfolio content and functions. The prospective users of the e-portfolio application were expected to have a hint of what is portfolios, e-portfolios, and gamification in education. The results show the students' preferences of what kind

of content and what game-like features that they want to be included in a gamified e-portfolio.

From the results gained through the pre-survey, we can learn about KPM students' demographics information (Section 4.3.1). From this demographic's information shows that KPM is currently populated with Generation Z or known as digital natives who are so familiar with computers and Internet from an early age as discussed in the research background section (Section 1.1). This information will help in identifying suitable e-portfolio features. If a gamified e-portfolio were implemented in these colleges, it would be an advantage because previous research has shown that game elements can possibly enhance user experience and engagement (Deterding et al. 2011; Kankanhalli et al. 2012; Diamantaki et al. 2013). For the current status of students' computer skills, Internet skills, devices used to access the Internet and current Internet services status, we can see that no visible constraints for the students in these areas because currently, they have a quite good infrastructure and Internet/computer skills.

From the students' current learning styles in archiving and organising their learning materials (Section 4.3.2), this pre-survey shows that most of the students keep their learning materials appropriately, like to share them, like to receive feedback on them, and like their friends to share their learning materials with them. It is no surprise that they prefer to receive feedback from their friends and lecturers the most. The main point to consider from the result in this section is that most of the students have experienced missing files and previous work. So, an e-portfolio might be an alternative solution for them to keep their learning materials in other form of media so it will be available when they need it.

Section 4.3.3 shows that half of the students have prior experience and knowledge with portfolios and e-portfolios. For e-portfolio content preferences, the profile page is the most preferred content while other items have the same level of importance to students with a slight difference in numbers.

Section 4.3.4 shows students do perceive the Internet as an important technology in the teaching and learning process as well as computers. Other findings in this

section is many students like to play computer games. Half of the students know what gamification is. Half of the students also have a misconception of games which they perceive is the same as gamification. About half of the students also knew what game elements and game dynamics are. This shows a partial understanding of games and gamification.

#### **4.5 Conclusion**

The results of the pre-survey will contribute to a better understanding of Kolej Profesional MARA (KPM) students' perceptions towards e-portfolios, what game-like features that they like to be integrated into the e-portfolios application, and further explore the possibility of increasing e-portfolio user engagement through the gamification of e-portfolios. It will give insights that might be elaborated on in the design and development phases of the gamified e-portfolio application to answer the research questions.

Designing useful and engaging e-portfolios to be used in an HEI is a challenging process. The classic e-portfolios to record formal and informal learning activities are not liked by the students and need to be further researched. One question that this research would like to explore is: Can game-like features be used within the e-learning (e-portfolio) application?

The results answer our first and second research questions, which suggested that:

- Students have access to the Internet;
- Students have suitable devices to connect to the Internet;
- Students have acceptable Internet and computer skills;
- The Internet services used by the students are deemed as satisfactory;
- Students frequently used the Internet;
- Points, feedback and status, are the top three preferred features to be included in the e-portfolio system;

- Profile page is the most selected content that the students want in their e-portfolio.

All of these imply that current infrastructure and facilities can support the use of an e-portfolio system if it is implemented in KPM and the preferred game elements are points, feedback and status.

To sum up, we have found that there is a promising potential of gamified e-portfolio to improve motivation and engagement of the students. The result of this pre-survey confirmed the assumptions of the researcher that the students are likely to use the e-portfolio application if it is available without major constraints regarding existing infrastructure and available facilities in each of the colleges. Furthermore, the students' current computer and Internet skills are in an acceptable condition. This is promising evidence that shows the students are ready for an e-portfolio implementation. This document is a source of evidence that the described community would get benefit from the e-portfolio and gamified e-portfolio.

#### **4.6 Limitation**

There are some limitations while conducting the pre-survey that limit the findings of the data collected.

- Due to the voluntary nature of the survey, it was quite difficult to get many participants to answer the questionnaire.
- The participants were confused what gamification is and think the game is the same as gamification, which is wrong.
- The participants also confused about paper-based portfolio and e-portfolios and did not have a clear idea of what kind of learning materials should be included in the e-portfolio.

#### **4.7 Chapter Summary**

The researcher proposes that the problems identified earlier could be addressed with the integration of game elements in the e-portfolio system to engage users. Through a literature review, the researcher has identified that a gamification approach will be used and the popular game elements that match with the game elements that students have selected in the pre-survey will be used to gamify the e-portfolio application. This gamification approach could increase student motivation and engagement in using the e-portfolio application. This is supported by the initial feedback from the students about gamification in education. The next chapter will discuss the theoretical framework underpinning the research work.



## Chapter 5

### Theoretical Framework

This chapter presents the theoretical underpinnings of the research and discusses related theories and models relevant to the research. This chapter positions our view of the research topic holistically and narrows down the focus on the gamification approach as a motivator to improve user engagement and motivation in e-portfolio applications. Figure 5.1 illustrate the conceptual framework of the study. Some part of the conceptual framework discussion has been discussed in the literature review chapter (Chapter 2).

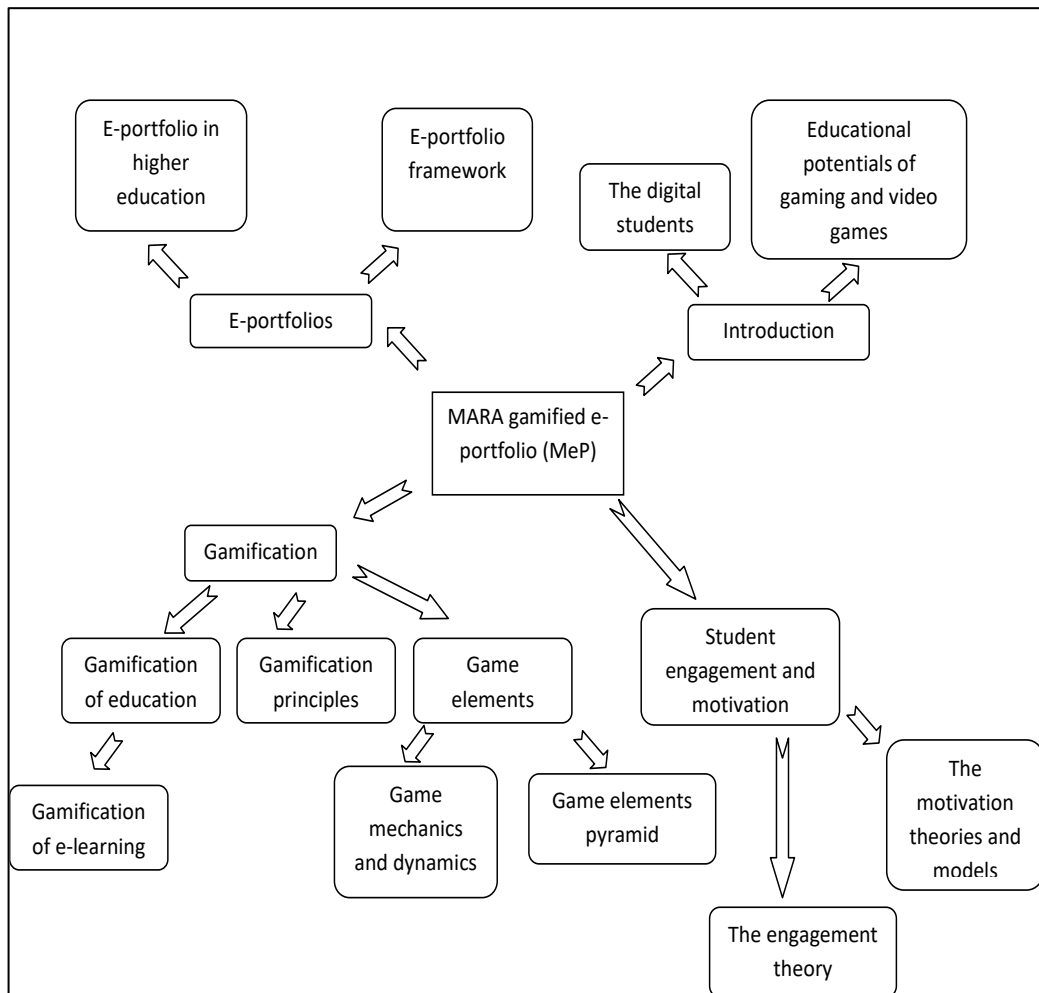


Figure 5.1: Conceptual framework of the study

## **5.1 Introduction**

E-portfolio user engagement has been addressed by many researchers through various approaches, but there is still room for improvement and more space for innovation to tackle the problem. Until recently, there has still been no solution to the user engagement problem in an e-portfolio application.

Gamification, on the other hand, has gained popularity for the past few years due to its potential to engage users across all domains and in education, especially in e-learning. However, as stated by Fitz-Walter et al. (2011), “as more and more non-game applications continue to use achievement systems, there is a need for further research into their design, use and effects”. The lack of empirical evidence across all domains makes research on gamification still open to further investigation and exploration. It was supported by Domínguez et al. (2013), “only a few empirical studies exist even though gamification in e-learning platforms seems to have potential to increase student motivation”. Regarding usefulness, Muntean (2011) agrees that “there is little research however regarding the usefulness of gamification in education”.

I propose that theories from computer or video games literature, e-portfolio literature, gamification literature, and discussions on student engagement and motivation theories could be integrated and extended to investigate gamification of e-portfolio applications towards user motivation and engagement.

## **5.2 Gamified e-portfolio framework**

Based on the theoretical analysis made by Muntean that gamification is a tool to increase engagement and the use of game-like techniques improve ownership and purpose when engaging with tasks, I explore their claim by gamifying an e-portfolio application to see the effect of the game-like technique towards user engagement and motivation. After discussing related theoretical underpinnings for my research

areas (e-portfolios, gamification, engagement, and motivation), I based my theoretical framework (Figure 5.11) from Barrett's e-portfolio development and implementation framework (Barrett 2005) for my e-portfolio design, from Werbach's game element pyramids for my gamification design (Werbach 2012), from Kearsley & Shneiderman (1998) theory of engagement and Self-Determination Theory (SDT) by Deci & Ryan (1985) for motivation approach that has been discussed in chapter 2. I use the framework from Nah et al. (2013) with slight changes to develop my MeP application (Figure 5.12).

The reasons why I choose these approaches and theories to base my theoretical framework for the gamified e-portfolios because it is crucial to integrate appropriate approaches and theories from these four dimensions: e-portfolio dimension, gamification dimension, engagement dimension, and motivation dimension.

#### ***A. E-portfolio dimension***

I choose the theory of learner ownership and control (Barrett 2005) of the e-portfolio because:

- The aim of MeP is to be a student-centered portfolio. The learner should take full responsibility and ownership of their own portfolios.
- I aim to change the nature of e-portfolio in the higher education institution from institution-based portfolio to the student-based portfolio in order to increase intrinsic motivation of the user. The user involves in the process of developing their portfolio, set their purposes of using it, and later populate the portfolio with relevant content will feel a sense of ownership and hopefully will have an inner drive to use it. This is to ensure more control and flexibility of the user as the user is the owner/master of their portfolio.
- To enable self-regulated learning activities.
- To include social learning activities using weblogs and social networking features (groups and forums) to engage users.

### ***B. Gamification dimension***

I find out that the game elements pyramid (Werbach, 2012) is suitable for the e-portfolio design. It is because,

- In my opinion, using Barrett's approaches is not enough to engage users. It is because e-portfolio (or e-learning) always considered as a formal form of application and it is only related to work with a mundane task. Furthermore, students in most of the higher institutions have been exposed with technology and games from their early childhood. When gamification is applied in educational area, the main difference between gamified and non-gamified systems is that the gamified one promotes another layer of interest and introduces a new way to join game elements in an engaging experience that motivates while educates students (Kapp, 2012).
- The game elements pyramid includes the game elements component, mechanics and dynamics that I need as a trigger to change student/learner behavior towards learning. I include the preferred game elements based on the results of the pre-survey from chapter 4 together with the popular game elements that has been used to gamify e-learning application; points, feedback (comment), status, levels, badges, and leaderboard.
- Appropriate game elements will make the e-portfolio more interesting, fun and engaging and change it from a linear and mundane task to do to something more exciting.

### ***C. Engagement dimension***

The engagement dimension was based on the theory of engagement by Kearsley & Shneiderman (1998) with the following components:

- *Relate*: learning through collaborations. This supports the social networking features (groups and forums) of the gamified e-portfolio.

- *Create*: learning using project-based approach. This supports the selection of content by the user/learner which can be a showcase of their best work or based on their subjects or courses.
- *Donate*: learning using an outside (authentic) focus. This support learning using other sources and support sharing of knowledge.

#### D. Motivation dimension

The self-determination theory by Deci & Ryan (2000) highlights the autonomy, relatedness, and competence which are required in the gamified MeP because it takes into accounts the autonomous motivation and control motivation of the user.

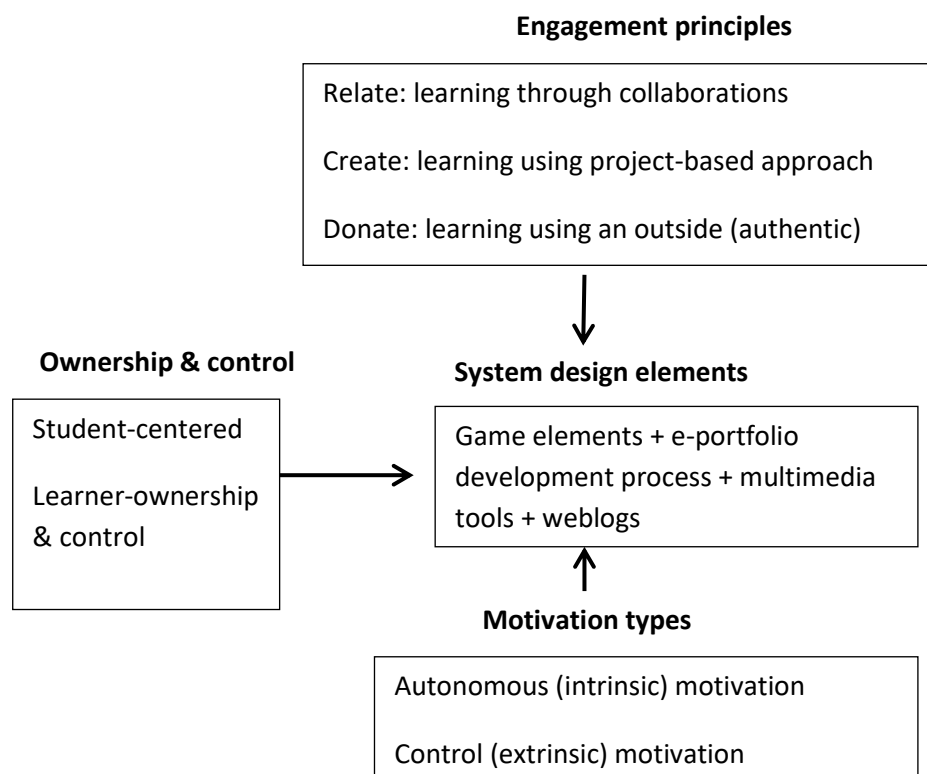


Figure 5.2: Gamified e-portfolio framework

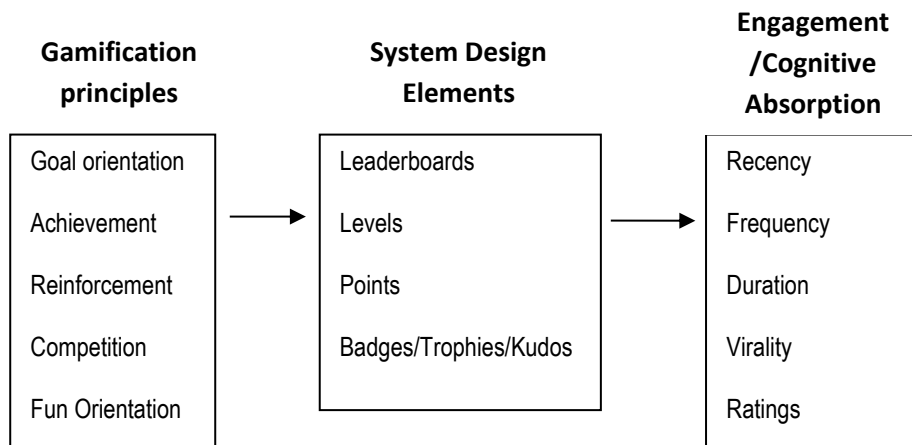


Figure 5.3: Adapted framework for gamification (source: Nah et al. (2013))

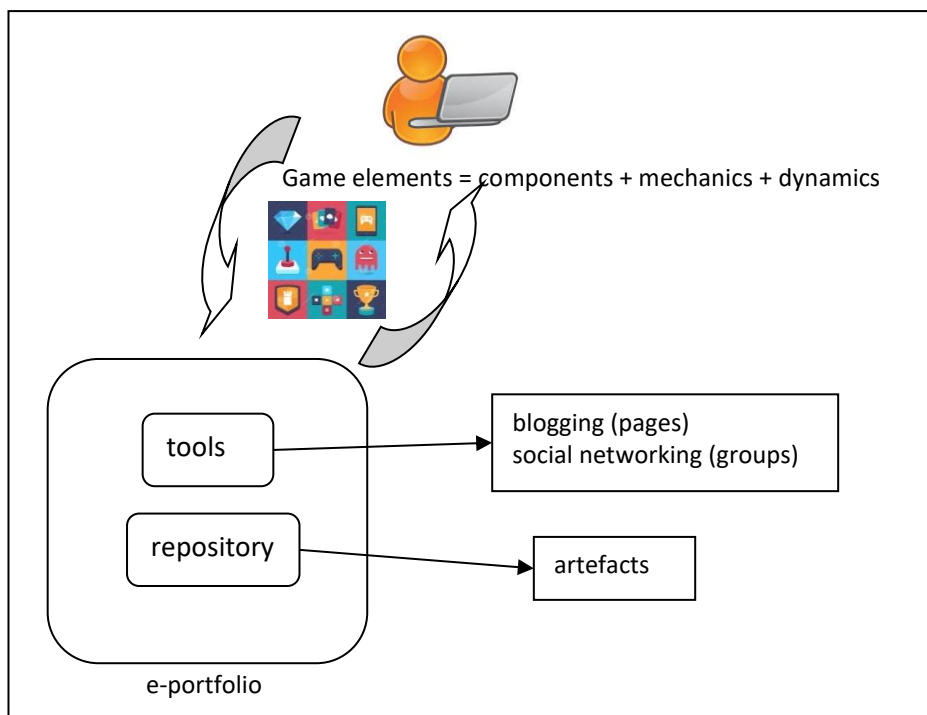


Figure 5.4: Gamified e-portfolio system design

The game elements are plugged in as motivators between the user and the e-portfolio application to increase interactions and drive the desired behaviour from the user. The user will be rewarded with points and badges for specific interactions with the tools and repository areas of the e-portfolios. In this proposed framework,

I consider the game elements as the “booster” or “trigger” to motivate users to interact with the e-portfolio application (Figure 5.13). Other than that, I propose a student-based portfolio rather than an institution-based portfolio to be implemented so that the student has full autonomy and responsibilities towards their portfolio creation and development. I also propose the use of blogs and social networking features (groups and forums) to create a sense of relatedness with the achievable task to show student’s competency as well as with their friends.

### **5.3 Chapter Summary**

This chapter has presented a discussion of the combined theories to base the framework. I then extended my discussion to the selected models and theories that has been discussed in chapter 2 for my primary research focus, which consists of e-portfolios, gamification and student engagement and motivation. Finally, the new gamified e-portfolio framework was presented. The next chapter presents the design and development of the proposed MARA ePortfolio (MeP) that was based on the context in this chapter.

## Chapter 6

### The MARA ePortfolio (MeP) System

This chapter will describe the design and development aspect of the gamified e-portfolio which is called MARA ePortfolio (MeP). As discussed in methodology chapter, I based my design and development of our MeP system on prototyping model by Carr & Verner (1997). It is a framework that is based on the idea of creating the whole or part of a system in a pilot version, called the prototype. The main goal of the framework is to build various versions and constantly revise those versions until a final product is reached through four phases of prototyping model: requirement analysis, prototype development, user testing and feedback, and product release. In this approach, prototype development and user testing and feedback phase were repeated to produce the final prototype. However, due to the time constraints to complete the research, I did two iterations of the prototype development and the testing and feedback phase for the gamified e-portfolio. The testing of the first version of the prototype was done by the system developer and improved. The testing of the second version of the prototype were done by several KPM students and Warwick students followed by more improvement to the prototype based on the feedback given. I chose existing system development approach because this thesis does not concentrate on the technical aspect of system developments.

#### 6.1 Introduction

This section reports on the design of a gamified system that encourages higher education institution students (college students) to make full use of the e-portfolio system as 'learners' to show their learning experiences and skills over time. Our research goal is to investigate the extent to which a gamified e-portfolio application can increase engagement in the e-portfolio creation and content development process. This stage of the research involved using inputs from the literature review



and our initial survey (pre-survey) of the suitable and preferred e-portfolio content and game elements to be included in the gamified e-portfolio system design. The results from this section provide important guidelines for future gamified e-portfolio system design and highlight the usefulness of conducting a prototype revision or refinement when designing for gamification.

## 6.2 The general description of MeP creation and content development

Portfolios have been around for so many years, and it gives a different meaning to different people. As been described in the previous chapters, e-portfolios have many different dimensions as suggested by (Cotterill et al. 2004) in their presentation at annual Staff and Educational Development Association (SEDA) conference, 2004. Please refer Figure 6.1 to the many different dimensions to portfolios.

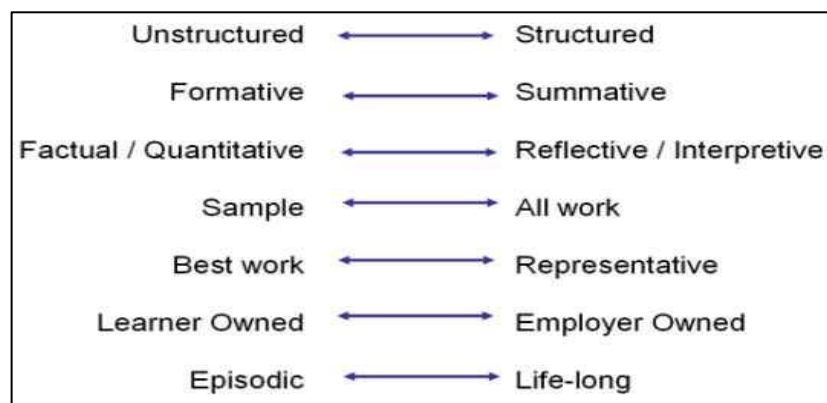


Figure 6.1: Portfolios dimensions (Cotterill et al. 2004)

The different dimensions of e-portfolios can be ranged from less structured, formative, learner owned portfolios to structured, summative, employer or institution owned portfolios. As I am using a gamification approach to the e-portfolio system, the left-hand side criteria of the e-portfolios from Figure 6.1 are more suitable for the gamified e-portfolio and have been used on the design criteria of the gamified e-portfolio as I want to explore the effect of the game elements

towards the e-portfolio usage. Therefore, the gamified e-portfolio is a presentation portfolio that is:

- Unstructured – the content will be based on user’s effort
- Formative – user can use their creativity to develop their own content
- Factual/quantitative – include realistic and quantifiable materials
- Sample – only selected materials will be added by user
- Best work – user can choose their best work to include in the e-portfolio
- Learner owned – student-based portfolio
- Episodic – student content creation will be occasionally

Value-added features of a gamified approach of an e-portfolio are as follows:

1. Multi-purpose
2. Sharable
3. Secure access for authorizing users
4. Fun
5. Improve collaborations
6. Improve communication
7. Improve feedback
8. More engaging
9. Motivate self-directed learning

Developing a gamified web-based portfolio to support students’ learning activities and communication was not an easy task. My gamified e-portfolio loosely integrated with offline or online curricula, but it is designed to motivate participation and content compilation/development from the user. The gamified e-portfolio is totally owned by the student (student-based portfolio) and not an institution-based portfolio. An institution-based portfolio has been wide-applied by many higher education institutions globally. Thus, I would like to explore a different approach to see student’s perception of the gamified e-portfolio. Furthermore, I

decided to use a more generic approach to portfolio creation and development compared to other e-portfolio systems used in higher education institutions.

I try to design an inviting gamified e-portfolio as discussed in section 5.5 Gamified e-portfolio framework under e-portfolio dimension which includes these elements:

- Student-owned or student-centered portfolio – student, take full responsibility for their portfolio content development
- Showcase portfolio – student can choose the best work to display or share
- Less structured content – depends on the student to choose what to be included in his/her portfolio
- Embedding a reward system (points, badges) – to improve user participation with the MeP system
- Social networking features – user-based which is users populate the network with conversations and content, community-driven which is members hold common beliefs or interest, and relationships which depends on the more relationships that a user have within the network, the more established the user toward the center of the network.

As defined by Tosh *et al.* (2006), social networking is a Web technology which allows users to discover new business or personal contacts by traversing relationship links between people, and then keep track of their activity within a system. With a less structured e-portfolio, I hoped that the student feels more at ease in using the system.

The gamified e-portfolio is different from a serious game application, or any common e-portfolio system that has been applied in many higher education institutions as it is neither a pure game application nor does it is an institution-based portfolio. Furthermore, it is inspired by social networking features by using the weblogs as proposed by (Barrett 2007) and a social networking style application to attract users as mentioned by Fogg (2009) that Facebook has persuaded millions of people to upload profile pictures which means that millions of people have all

had sufficient motivation and ability to do this when the suitable techniques of persuasive technology were applied.

With the use of our unique approach, the gamified e-portfolio framework (refer Figure 5.11 in theoretical framework chapter) to develop the MeP system through combination of the e-portfolio, gamification, motivation, and engagement approaches, I hoped that the results will give an insight and contribute to the knowledge of the gamification of an e-learning system. I have already discussed in detail about the gamified e-portfolio framework in the previous chapter, in section 5.5.

### **6.3 The MeP system design process**

The methodology used to design the MeP system is based on the prototyping model described in section 3.5 in the methodology. As mentioned in section 3.6.2, an adapted prototyping model was selected after making a comparison of the system development models (refer Table 3.5) based on the suitability of the model with the characteristics of the MeP system. Below are the activities done based on the selected model.

#### **6.3.1 Analysis of requirements**

##### *Requirements gathering*

To be able to do the analysis of requirements of the MeP system, I did the gathering of requirements activities as follows:

- **Identify the purpose of MeP system**

The purpose of MeP system is to provide a platform for a student's portfolio which includes a compilation of student's best work to showcase the evidence

of their knowledge growth throughout their college years. The added game elements would suggest some improvement in trying to maintain user's engagement with the application and increase user motivation to use it.

- **Identify the users of MeP system**

The targeted users of the MeP system are the students of higher education institutions generally and KPM students specifically with the support from the teachers/lecturers and the administrators of the system.

- **Determine the scope of MeP system**

In MeP, the student will create and manage the content of the e-portfolio themselves with guided steps. At the main page, unregistered users can see limited tabs such as *Login*, *Register*, *Home*, and *About*. Each student must register for the MeP account. After confirmation from the MeP administrator, the student can log in and access the home page. From this homepage, the student will be directed to other pages like *Members*, *User Groups*, *Members Activity*, *E-portfolio*, *Coursework*, *Forums*, and *MyProfile*.

- **Establish the objectives and success criteria of MeP system**

The aims for the MARA ePortfolio (MeP) project are:

- a. To develop a gamified web-based portfolio system to support students' learning activities (formal and informal learning) and stimulate reflective approach to giving feedback and improve communication among users via the use of game elements.
- b. To promote the reflective capabilities of students, giving more responsibility and trust for managing their own learning.
- c. To promote a less formal approach to e-portfolio usage among students.

- d. To facilitate assessment of learning outcomes and extra-curricular or out-of-school related learning activities.

The success of the application depends upon meeting the following core set of objectives:

- a. The design of the command mechanism to assist the user in creating and developing the portfolio.
- b. The design of add/update/delete/publish capability of the portfolio content.
- c. The design to include social networking features to attract users to participate.
- d. The design to include game elements in the graphical user interface (GUI) like points, badges, and leaderboard.

#### *Analysis of system requirements*

The analysis of the system requirements revealed several important aspects:

- **MeP perspectives**

MeP enable the users to create and manage their own portfolio for a showcase purpose. This online portfolio enables the user to enhance their posts with photos, audio, video or text documents that can be inserted as hyperlinks or file-sharing services. MeP is an independent application which can be linked to individual blog and websites and/or to institutional websites or Learning Management Systems (LMS). Any devices with internet access can be used to access MeP.

- **MeP features**

The application must be able to:

- i. Register new user.

- ii. Give access to authorise user and denied access to the unauthorised user.
- iii. Create and update their user profile.
- iv. Create, organize, and update their portfolio content.
- v. Allow registered users to give comments and feedback in MeP.
- vi. Rewards registered users for participating and using the MeP (game elements: points, badges).
- vii. Show leader board of active users (game element).

- **Operating environment**

The MARA ePortfolio (MeP) application has been developed using WordPress.org and its extensive plugins. I used Windows operating system for the development and implementation phases of the MARA ePortfolio (MeP) system prototype.

- **Software requirements**

There are a range of software options available and various types of e-portfolio software on the market. The three basic types of software as stated by Madden (2007) are in-house solution, commercial software, and open source software. These e-portfolio softwares can be institution-based e-portfolio like Mahara and Moodle or individual-based e-portfolio like WordPress. As I have decided to build a student-based portfolio, I choose to develop my gamified e-portfolio using WordPress. WordPress is an online, open source website creation tool written in PHP. Another reason why I choose Wordpress was that it is easy to learn and use blogging and website content management system (or CMS) and less complex than Moodle and Mahara which need a team to make some changes in terms of the design to include new game elements tools/features.

There are two choices of WordPress: WordPress.com which is mainly used as a blogging platform, where all material is hosted by WordPress; and WordPress.org which has extensive additional features (Plugins) which extend it

beyond blogging use. WordPress.org is self-hosted; the users provide their own web space for putting material online. For my research purposes, I use the latter to maximize the use of the extensive plugins of the Wordpress due to the researcher's time constraint and programming skills limitation.

For the programming environment, Adobe Dreamweaver has been used to create the website and application using web-friendly artwork. My intention of using Dreamweaver was also because I wanted the MeP system to be used across multiple targets including browsers, smartphones, and tablets. Other than that, the development environment of our MeP was based on the use of PHP, MySQL, HTML, CSS, SQL, and JS on a Windows machine. I bought a domain at [www.exabytes.my](http://www.exabytes.my) while the web hosting services were from SiteGround.com.

- **Data requirements**

The MeP needs several inputs for generating the portfolio for showcasing (presentation portfolio and not assessment portfolio) as I want it to be less formal. The types of inputs that MeP accepts are photo/image, audio, video, text document, HTML. Therefore, the MeP system will need a collection of related media (photos, audio, video, or text document) to be included in the e-portfolio. The users need to generate and supply these inputs using other mediums or provide hyperlinks of related media to their e-portfolio. The user can preview the portfolio at any point in time.



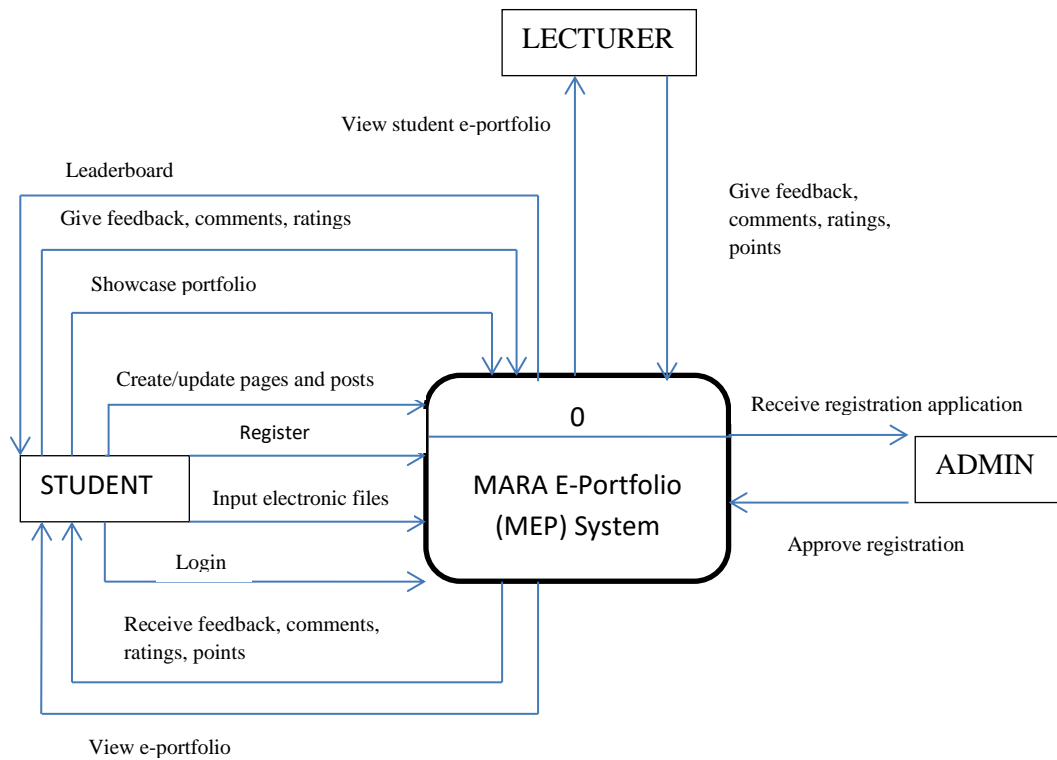


Figure 6.2: The MeP Context Diagram

This context diagram (Figure 6.2) illustrates the MeP system design to guide the development activities of the system.

- **Assumptions and dependencies**

The following assumptions have been made based on the pre-survey findings:

- a. The user has an average computer and internet skills.
- b. The user has some previous knowledge of using similar websites or blogging software.
- c. The user already has their collection of related media (photos, audio, video, or text documents) to be used in their e-portfolio.

Below are the dependencies or what MeP system needs to be able to run smoothly:

- An internet connection to access the application (user have acceptable internet connection).
- A browser for viewing the published portfolio.
- A player for previewing the video in the presentation.
- JAVA runtime environment and some additional packages.

### 6.3.2 Development of prototype

The MeP has been developed as a simple showcase e-portfolio (presentation portfolio) using WordPress.org with carefully selected game elements. Basically, MeP is a showcase portfolio which compiles student’s best work to showcase as an evidence of their knowledge growth throughout their college years. The added game elements would suggest some improvement in trying to maintain user’s engagement with the application and increase user motivation to use it. Other than that, I would like the MeP to be as public as it can but somehow exclusive for the members. Below is the sitemap of the MeP system (Figure 6.3) which clearly illustrates the member and non-member areas.

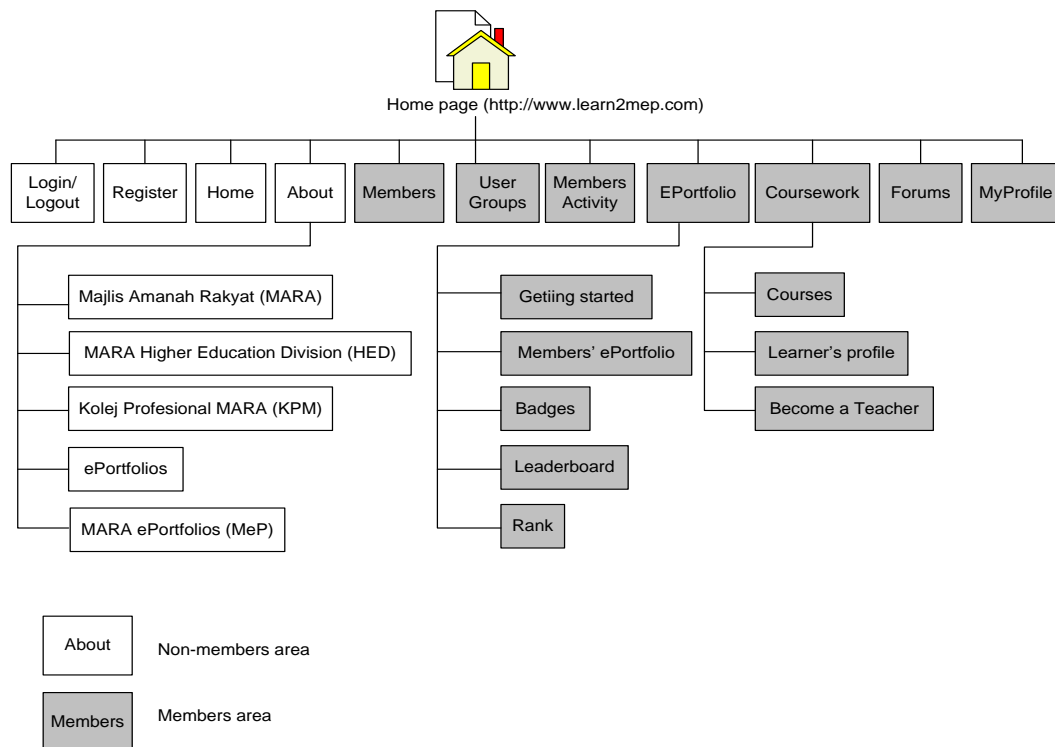


Figure 6.3: MeP system sitemap

### **The MeP system design elements**

As illustrated in Figure 5.11 in chapter 5, theoretical framework, I present the MeP system design elements which include the game elements, e-portfolio development process, multimedia tools and weblogs.

#### *Game elements*

Based on the results from the pre-survey as presented in chapter four (refer Figure 4.11, preferred e-portfolio features) and the most used game elements to gamify an application through literature survey, I decided to use points, badges and leaderboard. These three game components were known as the points, badges, and leaderboards (PBL) triad that has been claimed by Werbach and Hunter (2012) as the three basic game mechanics that almost always appear supported by studies by Zichermann and Linder (2013) that described the PBL as the five game design elements, alongside levels and rewards and Hamari, Koivisto and Sarsa (2014) also stated that the PBL as the top-three elements in gamification research. By using the PBL triad: points, badges, leaderboard (Table 6.1) as the extrinsic motivators will trigger the required intrinsic values like belonging, autonomy, power, mastery, meaning, learning, self-knowledge, and fun.

*Table 6.1: The game components of MeP*

<b>Game components</b>	<b>Meaning in MeP</b>
Points	Keep score based on user's activity, determine completed tasks, connect to rewards (badges), provide feedback (accumulated points represent how much the user interact with the MeP), display of progress, data for the MeP admin, can be used to represent anything (a universal currency)

Game components	Meaning in MeP
Badges	Representation of achievements (that people can see), flexibility (can represent whatever the admin want/wants to motivate, signalling of importance, collections, social display (status symbols)
Leaderboard	Ranking (feedback on competition), pride (as the top users among members)

The chosen game components (Figure 6.4) were based on the pyramid of gamification elements by Werbach (2012). From these three components, I tried to get the users to go through the process of challenges, competition, cooperation, feedback, and rewards in order to feel the emotions (fun, excited), progression and relationships of the e-portfolio content development activities through the help of multimedia tools (audio, video, document) and weblogs.

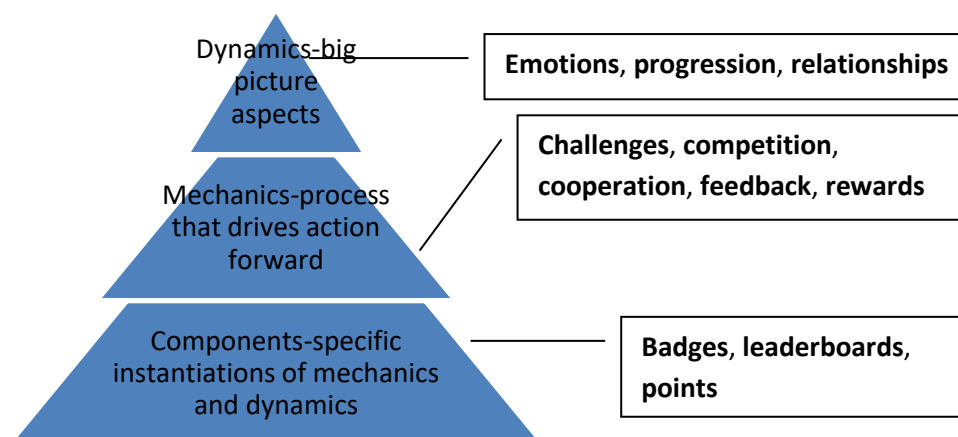


Figure 6.4: Adapted pyramid of gamification elements

### *E-portfolio development process*

There is a simple instruction to assist the user through the e-portfolio development process. I design the MeP system based on the available activities that has been categorised into five main categories: create, communicate, navigate, participate,

and evaluate. Users can participate in the MeP system and can create their own portfolio through the MeP website. The user can also view other member's e-portfolio (pages) to get ideas to create their own portfolios.

### *Multimedia tools*

The MeP enables users to upload and download many forms of media such as a document, audio, and video with a basic multimedia tool like editing details or the media itself. These features will enable the users to include variety learning evidences to their portfolios to make it meaningful.

### *Weblogs*

The MeP also allowed users to create their personal blogs (formal or informal) to reflect on their learning activities or learning journey. These blogs are totally owned by the user so that they would feel a sense of responsibility and belonging to the content creation. Other than that, the MeP user interface is similar to popular social networking sites like Facebook so users can learn to use it in quickly.

### **Gamification Design**

In MeP, I try to reward the user who participates with MeP activities and populate their e-portfolio content. Based on the selected game components (points, badges, and leaderboard), the description below explains how I use the game components to reward the user.

The user will receive a point if they do the following activities:

- i. Points for registration
- ii. Points for daily visits
- iii. Points for viewing content
- iv. Points for logins

- v. Points for comments
- vi. Points for clicking on links
- vii. Points for viewing videos
- viii. Points for creating galleries/albums or uploading new photos
- ix. Points for earning badges
- x. Points for participating in forums
- xi. Points for participating/web interactions (between members/groups)

I provide several badges to the users if they completed a series of task such as:

- i. Profile badge – if they complete their profile
- ii. Avatar badge – if they upload their avatar
- iii. Site-visit badge – if they frequently visit the MeP system
- iv. Login badge – to motivate frequent login to the site
- v. Welcome badge – to welcome new user to the site

Other than that, I decided to include two more game components for the user to be able to collect a badge, ranks (see Table 6.2) and achievements.

*Table 6.2: Ranks*

Points gained	Rank	Activity encouraged
1-199	Beginner	Basic level of participation in the e-portfolio like logging in and visit a content
200-499	Intermediate	Intermediate level of participation in update status and giving comments
500-799	Advanced	Advance level of participation like joining group, add friends, creating a document, uploading media, giving comments to document and media
800-999	Experienced	Experience level of participation in creating a site and publish a post

In achievements, the user will get a badge for the following activities:

- i. Friendster – user accepts a friendship request, user send a friendship request

- ii. Participator – user replies to a topic, user creates a new topic, user closes a topic, user creates a new forum, user opens a topic for new replies, user replies to an item in an activity stream, user writes an activity update message, user writes a message in a group’s activity stream, user create a group, user invites someone to join a group, user joins a group, a comment is written by the user, user publishes a blog post
- iii. Creator – user publishes a blog post
- iv. Blogger – user create a site (under the main site) and publish a post

The accumulated points will contribute to the user’s status in the leaderboard and will be displayed on the homepage.

I categorise the activities into five main categories: create, communicate, navigate, participate, and evaluate. Below is the mapping of MeP activities with the game components (Table 6.3 and the illustration of our gamification design (Figure 6.5).

*Table 6.3: Mapping of MeP activities with the game components*

Category	Activity	Point	Badge
Create	Login Complete user profile Create a page Add a post Upload any media	Points for registration Points for logins Points for daily visits Points for publishing content	Welcome badge Login badge Avatar badge Profile badge Newbie badge Warm-up badge Novice badge Master badge
Communicate	Add friends Give comments Reply to a topic in forum	Points for requesting a friend, accepting a friend’s request Points for a reply to a topic	Commentator badge Friendship badge
Navigate	Browse through the sites and your friend's e-portfolios (by clicking on any of the content)	Points for viewing content Points for clicking on links Points for viewing videos	Site-visit badge
Participate	Join groups and forums Participate in the discussion(s) Create your own topic	Points for group creation/deletions/group avatar upload/group cover upload/new forum topics/editing forum topics/new forum	Active learner badge Community activist badge

Category	Activity	Point	Badge
		posts/editing forum posts/joining groups/leaving group groups/new comments	
Evaluate	Give feedback or comments to your friend's portfolios	Points for comments	Innovator badge

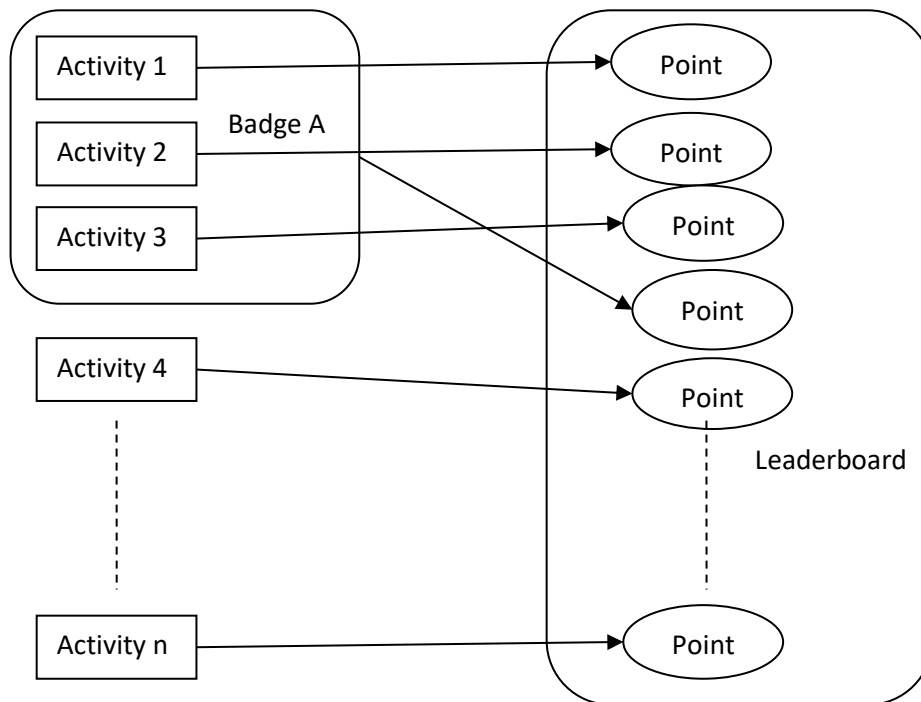


Figure 6.5: The gamification design

The MeP user interfaces has been attached in the Appendix B for references to give clear examples of the MeP design using gamified e-portfolio framework as discussed in the earlier part of this chapter.

### 6.3.3 User testing and feedback

Before implementing the gamified e-portfolio, it is important to test the MeP system prototype and get the feedback to improve the system. A pilot test was



conducted to test the system with four students from Kolej Profesional MARA Indera Mahkota (KPMIM) and three PhD candidates from Warwick University. A request was sent to the participants to voluntarily participate in the pilot test following the ethical procedures.

After the request was accepted, a set of questions with clear instructions (refer Appendix J) was sent to each individual participant through their email. Each participant was required to access the MeP system prototype at [www.learn2mep.com](http://www.learn2mep.com) and tries to use it and after subsequent use of the prototype, gave their feedback. Results from the pilot test were used to revise and improve the MeP system prototype and the questionnaire and interview instruments to be used for the post-survey of the study.

The results reflected as the prototype was functional well and interesting but there are some improvements needed such as the smoothness of the navigation, clearer instructions to guide the user and more inviting user interface (graphics).

#### **6.3.4 Prototype revision or refinement**

Based on the results of the pilot test, I made some improvements on the navigation arrangements, added simple and clear instructions to the user and change the graphics size for the banner to a standard size combined with different font type and font colour. Other than that, during the pre-implementation phase, the students and lecturers who had agreed to participate to use and evaluate the system through online survey were given about two weeks to try and use the system and give feedback to the system administrator. More minor improvements were done based on the feedback.

### **6.3.5 Final product release**

The final product was released, and I started the implementation of the gamified e-portfolio system at KPMIM. The invitation for the students to use the system has been extended to participants from other colleges. The introduction of the MeP system was done by the lecturer during their class session. During the implementation, the students were able to communicate with their respective lecturers and seek help directly from the system administrator if they need help or give feedback and comments regarding the system.

### **6.4 MeP Design and Development Challenges and Limitations**

For the research purpose and due to introductory phase of the gamified e-portfolio in Kolej Profesional MARA (KPM), I only tested on limited e-portfolio functions with one (1) subject, Digital and Mobile Communication (DNMC) for a semester to see the potential of the gamified e-portfolio in engaging students in using an e-learning application.

I have developed the MeP system as a single developer with a limited knowledge in programming and designing skills. Furthermore, finding a good and reliable web hosting services and specific domain to provide an e-portfolio with a quite heavy traffic of usage between the users that had cost me a lot in terms of money, energy, and effort.

### **6.5 Chapter Summary**

This chapter discussion started with a brief introduction to the MeP System development approach followed by a general description of the MeP creation and development activities including the different dimensions of e-portfolios, value-added features of MeP and the gamified e-portfolio framework used. Then, I

described the MeP system design process based on the prototyping model: analysis of requirements, development of a prototype, user testing and feedback, prototype revision and refinement, and final product release. The MeP design and development challenges and limitations were briefly discussed followed by the chapter summary.

## Chapter 7

### Student's Perception of MARA ePortfolio (MeP)

This chapter presents the student's perception of MeP (gamified e-portfolio) that has been developed and implemented. It describes in detail the results of the post-survey of the MeP system and the interview. The post-survey was conducted in KPMIM, but participants from KPMB who have been using the MARA ePortfolio (MeP) system were also invited to answer the post-survey. The interviews were also conducted in KPMIM with the consented respondents who participated in the post-survey. The findings from this study will shed light on the gamified e-portfolio and the effect of the game elements towards users' interaction with the system.

#### 7.1 Introduction

This chapter provides a post-survey finding of Kolej Profesional MARA (KPM) students' perceptions of the MARA ePortfolio (MeP) system, a gamified e-portfolio application. Information such as participants' demographic information including their Internet access evaluation, students' feelings towards the gamified e-portfolio system and their feedback on game elements inside MeP were collected and analysed. The students' prior experiences with e-portfolios together with their evaluation of the MeP in terms of engagement, motivation, learning and usability were also studied.

This chapter also describe the interview processes, how it has been analysed and the summary of responses from participants. The results of the survey in conjunction with the results from the interviews are hoped to contribute to a better understanding of students' perceptions towards gamified e-portfolio systems.

## 7.2 About the Post Survey

The post-survey was conducted to get students' perceptions of gamified e-portfolios and game elements after using the application for a specified duration. Furthermore, the aim of the survey is to see the effects of the game elements on user motivation and engagement. Thus, this section is crucial to answer the following research questions.

Research question 3: *How usable and useful will students find the game elements in the e-portfolio system?*

RQ 3.1 Do points, badges, and leaderboards make users want to update their e-portfolio content?

RQ 3.2 Do points, badges, and leaderboards improve user visits to the e-portfolio system?

RQ 3.3 Do points, badges, and leaderboards increase the frequency of users updating their e-portfolio?

RQ 3.4 Do points, badges, and leaderboards encourage users to share more artefacts in their e-portfolio?

RQ 3.5 Do points, badges, and leaderboards encourage users to give more feedback on others' artefacts in an e-portfolio system?

Research question 4: *How can the implemented game mechanics (points, badges, leaderboard) increase user intrinsic values?*

RQ 4.1 Do points, badges, and leaderboards make users feel a sense of satisfaction?

RQ 4.2 Do points, badges, and leaderboards make users feel a sense of achievement?

RQ 4.3 Does getting a reward (points, badges) after completing a task/activity motivate a user to update their e-portfolio content?

RQ 4.4 Does getting a reward (points/badges) after completing a task/activity encourage a user to participate/ interact more with an e-portfolio system?

### **7.2.1 Aims and Objectives**

The goals of the post-survey were to find out the demographics of the users, Internet access evaluation, students' prior experience with e-portfolio, students' opinion on e-portfolio benefits, students' feedback on game elements, students' feedback and evaluations on the MeP system in terms of engagement, motivation, learning and usability.

The objectives of the post-survey included:

- collecting demographic information;
- finding out if the users' have acceptable access to the Internet;
- finding out users' prior experiences with e-portfolios;
- collecting students' opinions on e-portfolio benefits;
- collecting students' feedback on the game elements;
- collecting students' evaluation of the MeP system.

### **7.2.2 Methodology**

The gamified e-portfolio system tool MeP was developed as a web application. As the tool was relatively straightforward for the students to use and it is an easy to use social networking style application, there was no training provided. However, participants were given a quick overview and demonstration of MeP, how to use it and what they can use it for in the beginning of the implementation. During the first week of implementation, students were given opportunity to explore the gamified

e-portfolio. They were encouraged to create their own e-portfolio, populate their e-portfolio with their learning materials to assist their learning inside the classroom and outside the classroom, navigate the e-portfolio content, participate and communicate with other registered users and evaluate (giving feedback) their friends' e-portfolio content. Students can contact the system administrator if they face any problem while using it. Students were required to use the gamified e-portfolio for a semester (between 18 January 2016 and 1 April 2016), and their opinions about MeP were collected through an online survey (from 25 April 2016 to 9 May 2016) for analysis. The study was carried out in KPMIM. Other participants who have been using the MeP from other colleges were also invited to answer the online survey. However, a very small numbers of participants from KPMB which is only five (5) participants responded to the survey compared to forty-six (46) participants from KPMIM. Other than that, interviews have been done from 11 to 14 April 2016, to gather richer data for triangulation. All participation was voluntary.

The questions for the survey instruments were obtained from previous studies that examined the effect of games on learning. Our survey instruments evaluated the impact of the gamified e-portfolio based on the dimensions of engagement, enjoyment, motivation, usability and learning. The "engagement" and "enjoyment" constructs from Whitton (2007), and Feng et al. (2008) were used to measure engagement and enjoyment respectively. To measure the learning dimension, questions from the "Usefulness" construct from Bourgonjon et al. (2010) were used. To measure the usability dimension, adapted questions from the usefulness construct from the System Usability Scale (SUS) by Tullis and Stetson (2004) were used.

#### **7.2.2.1 Validation**

##### **Content validation**

In order to make sure the items measured assess the same content, the content validation activity has been done. The content validation activity was applied to

confirm that the post-survey contents were suitably aligned with the objectives of the post-survey. The post-survey online questionnaire was sent to three PhD candidates in the Computer Science Department and in Centre of Education Studies at Warwick University and four students from KPMIM to test the readability and understanding of the questions. After validation, some minor modifications and alterations in the questions' structure, wordings and content related to the post-survey objectives were made based on the student's responses, whether the question is essential, useful or irrelevant to measuring the construct under study.

### Reliability test

The questionnaire was employed to measure different, underlying constructs and was tested for reliability to determine the internal consistency of three constructs, 'student feedback on the advantages of e-portfolios', 'student opinion on gamified e-portfolios' and 'student feedback on game elements inside e-portfolios'. The student needed to rate how the gamified e-portfolio had helped them with their current courses for the 'student feedback on the advantages of e-portfolios' construct. They also needed to evaluate how they felt about the gamified e-portfolio for the 'student opinion on gamified e-portfolio' construct, and the student needed to assess how the game elements in the e-portfolio helped them to keep using the application for the 'student feedback on game elements inside e-portfolio' construct. The assessment was performed using a 5-point Likert scale (1=strongly, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). Table 1 shows the reliability test (Cronbach's alpha) for the three constructs which indicates that all Cronbach's values are > 0.7. The scales had a high level of internal consistency, as determined by Cronbach's alpha values as listed in Table 7.1.



Table 7.1: Reliability test for the study

Construct/Dimension	Number of questions/items	Cronbach's alpha
Student feedback on the advantages of e-portfolios	10	0.967
Student opinion on gamified e-portfolios	31	0.965
Student feedback on game elements inside e-portfolios	11	0.967

### 7.2.2.2 Post-Survey Design

The post-survey started with an introductory page about the e-portfolio surveys. Participation was voluntary. The responses remained strictly confidential. The questionnaire was divided into seven sections.

#### A. Demographics.

This section was designed to collect the demographics data covering age, college name, course registered, the semester of study and gender. The evaluation of the Internet access was also collected as this information is necessary.

#### B. E-portfolio benefits.

This section consisted of ten (10) five-point Likert scale items and was designed to collect data about the advantages of the e-portfolio in terms of usability and learning based on the students' experiences in using the MeP.

#### C. Students' feedback towards gamified e-portfolio (MeP).

This section had thirty-one (31) five-point Likert scale items. It was designed to collect data about students' perceptions and feelings towards MeP.

**D. Students' feedback on game elements of MeP.**

This section had eleven (11) five-point Likert scale items and was designed to collect data about students' opinions of the game elements benefits in MeP.

**E. Students' prior experiences with e-portfolio).**

This section had seven (7) items and was designed to collect data about students' current experiences with e-portfolio creation and development.

**F. MeP evaluations: engagement, motivation, learning, usability.**

This section had twenty-four (24) items and was designed to collect data about students' evaluation of MeP in terms of engagement, motivation, learning, and usability.

At the end of the online questionnaire, I included the interview consent form. Students who give their consent will be interviewed.

### **7.3 Post-survey findings**

The results were based on online questionnaires answered by the students from the Diploma in English Communication (DEC) who had been using the MeP system. A few participants from Higher National Diploma in Computing (System Development) (HND SYD), and Diploma in Computer Networking (DCN) also answered the survey. The questions were prepared in both English and Malay languages for better understanding.

Aspects studied are (i) demographics, (ii) student feedback on the advantages of e-portfolios, (iii) student's opinion of MeP, (iv) students' opinions of game elements in MeP, (v) KPM students' current experiences with portfolio creation and development, and vi) students' evaluation in terms of engagement, motivation,

learning, and usability of MeP. The approach used to collect the data was through an online questionnaire (quantitative) and interviews (qualitative).

### 7.3.1 Demographics

There were 52 participants who decided to participate in the research and completed the online survey. Of the 52 responses, 1 was incomplete and was not considered for this study. The remaining sample of 51 participants was found to be representative of the population in terms of gender, age, college, course, and semester (refer Table 7.2). The participants consist of more female (73%) compared to male (27%) students, and most participants are from KPMIM (90%) who studied Diploma in English Communication (DECOM) course (84%).

*Table 7.2: Participants' demography*

Characteristics	Count (n=51)	Percentage, %
<b>Gender</b>		
Male	14	27%
Female	37	73%
<b>College</b>		
KPMIM	46	90%
KPMB	5	10%
<b>Course</b>		
DECOM	43	84%
DCN	3	6%
HND SYD	5	10%
<b>Semester/Year of study</b>		
6/ Year 3	2	4%
5/ Year 3	5	10%
4/ Year 2	40	78%
1/ Year 1	4	8%

## Age

A total of 51 respondents participated in the online post-survey. The range of the participants' age was between 17 and 38 years. Measures of central tendency were computed to summarize the data for the age variable. Measures of dispersion were computed to understand the variability of scores for the age variable. The mean value is 21.78, and the standard deviation is 4.765.

## Semester

The range of the participants' semesters of the study was between semesters 1 to semester 6 (refer Table 7.2). The mean value is 4.06, which shows that most of the respondents are in semester 4 and the standard deviation is 0.988, which indicates that the semester of study of the respondents does not vary.

## Internet access evaluation

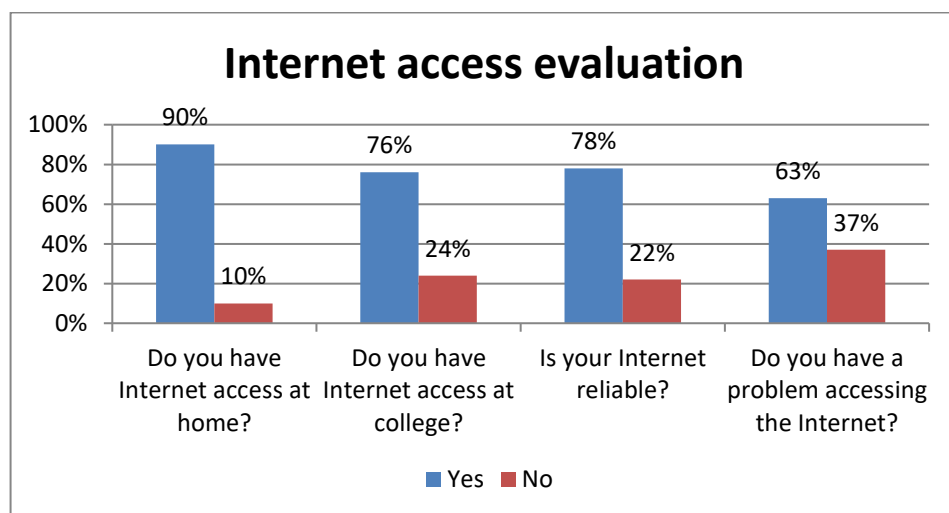


Figure 7.1: Internet access evaluation (n=51)

For the Internet access evaluation, Figure 7.1 suggests that most of the participants have Internet access at home (90%) and college (76%) respectively. 73% of the

respondents claim that their Internet access is reliable. However, more than half of the respondents have a problem accessing the Internet, which needs further investigation.

### 7.3.2 Student feedback on the advantages of e-portfolio

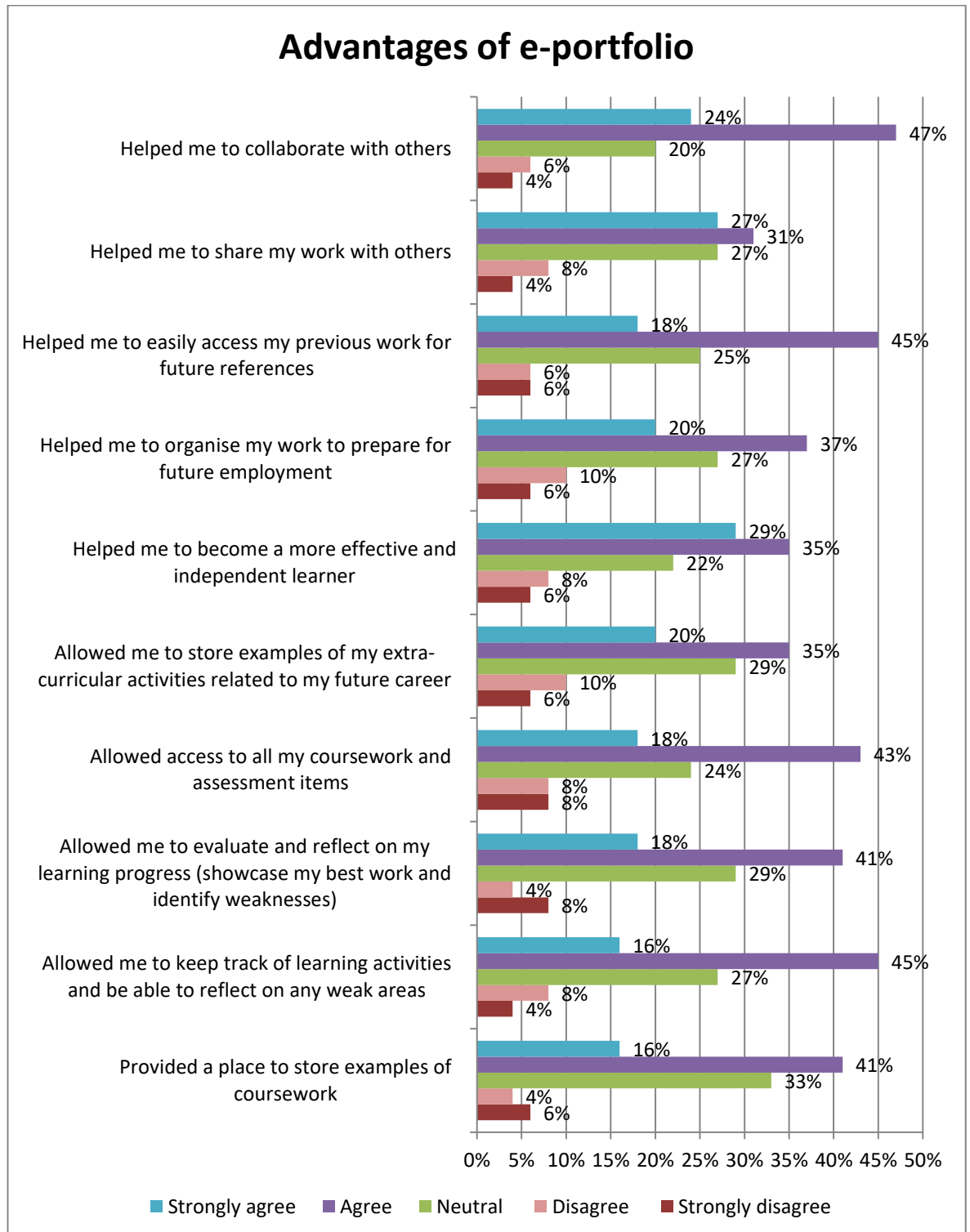


Figure 7.2: Advantages of e-portfolio (n=51)

#### **7.3.2.1 Provided a place to store examples of coursework**

Results from Figure 7.2 for 'Provided a place to store examples of coursework' support the hypothesis that the e-portfolio provided a place to store examples of user coursework. We can see that more than half of the students agree that an e-portfolio provide a place to store their coursework examples (41% agree, 16% strongly agree). However, quite a number of participants choose 'neutral' for some reasons, and further investigation is needed.

#### **7.3.2.2 Allowed me to keep track of learning activities and be able to reflect on any weak areas**

By referring to Figure 7.2 for 'Allowed me to keep track of learning activities and be able to reflect on any weak areas', more than half of the respondents agreed (45% agree, 16% strongly agree) that e-portfolio allow them to keep track of their learning activities and make them be able to reflect on their weak areas, which support our hypotheses.

#### **7.3.2.3 Allowed me to evaluate and reflect on my learning progress (showcase my best work and identify weaknesses)**

Keeping track of once progression in learning is important. Figure 7.2 for 'Allowed me to evaluate and reflect on my learning progress (showcase my best work and identify weaknesses)' shows that e-portfolio help participants to evaluate and reflect on their learning progress with 41% participants agree, and 18% strongly agree with it. This indicates that e-portfolio plays a quite significant role in assisting their learning.

#### **7.3.2.4 Allowed access to all my coursework and assessment items**

Figure 7.2 for 'Allowed access to all my coursework and assessment items' figures suggests that respondents agreed that e-portfolio allowed access to all their coursework and assessment items. 43% participants agree, and 18% participants strongly agree that they can access their coursework and assessment items. This implies that e-portfolio assisted them in getting to their learning materials, which can be very useful.

#### **7.3.2.5 Allowed me to store examples of my extra-curricular activities related to my future career**

Figure 7.2 also suggests that e-portfolios allowed the users to store examples of their extra-curricular activities related to their future careers with 35% agree and 25% strongly agree with it. This gives an advantage to them to show to their potential employer in the future.

#### **7.3.2.6 Helped me to become a more effective and independent learner**

Figure 7.2 for 'Helped me to become a more effective and independent learner' suggesting that the e-portfolios do help the users to become more active and independent learners (35% agree, 29% strongly agree). In e-portfolio, it is the student's responsibility to keep their learning materials, manage it and see their progress. They can also share their work with their friends and other users to get feedback to improve their work.

#### **7.3.2.7 Helped me to organise my work to prepare for future employment**

As illustrated in Figure 7.2 for 'Helped me to organize my work to prepare for future employment', students do feel that the e-portfolios help them to organise their work to be able to prepare for their future employment with 37% agree and 20%

strongly agree with it. Students can easily share their best work with potential employers and others.

#### **7.3.2.8 Helped me to easily access my previous work for future references**

Most of the MeP users agreed (45% agree and 18% strongly agree) that the e-portfolio helped them to obtain their previous work for future reference. This helps them to keep their work digitally and avoid losing their previous work.

#### **7.3.2.9 Helped me to share my work with others**

More than half of the participants (Figure 7.2) think that the e-portfolio helped them to share their work with others. In learning, sharing learning materials and knowledge is essential to enable knowledge transfer from one learner to another learner and between teachers and learners.

#### **7.3.2.10 Helped me to collaborate with others**

Figure 7.2 illustrates that most of the participants agreed (47% agree, and 24% strongly agree) that the e-portfolio helped them to collaborate with others. In learning, especially e-learning, collaboration means a lot to the learners. They can get more ideas and feedback from their friends to improve their knowledge and skills.

### **7.3.3 Student opinion on gamified e-portfolios**

Below are the results I gained regarding students' opinion on gamified e-portfolios in terms of engagement, motivation, learning and usability.



### 7.3.3.1 Engagement

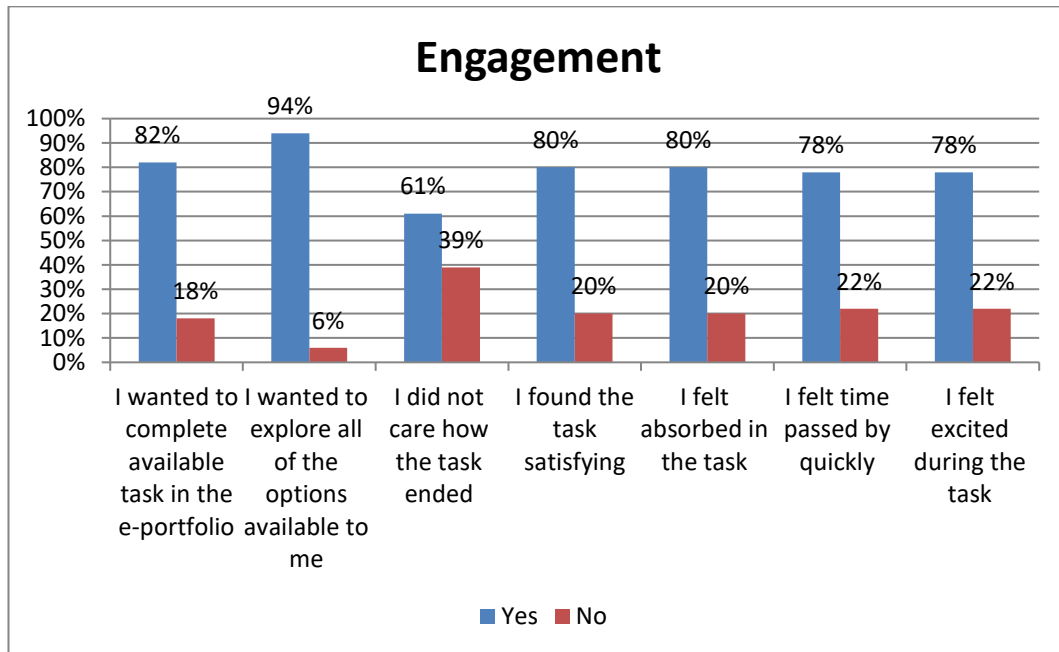


Figure 7.3: Engagement (n=51)

I use seven questions to evaluate user engagement for the gamified e-portfolios. Based on the answers from the post-survey, most of the users did feel that they were engaged with MeP (Figure 7.3).

### 7.3.3.2 Enjoyment

*Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?*

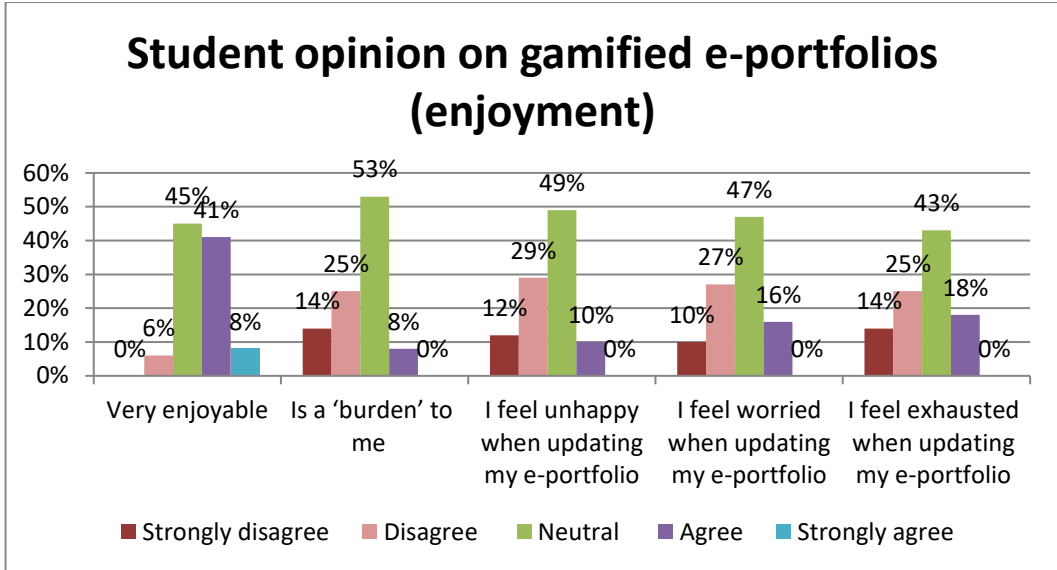


Figure 7.4: Student opinion on gamified e-portfolio – enjoyment (n=51)

I use five questions to evaluate student opinion on MeP in terms of enjoyment. For 'very enjoyable' item, only 6% of the students think that the gamified e-portfolio was not enjoyable while the total of 49% participants agreed (48% agreed and 1% strongly agreed) that the gamified e-portfolio was somewhat enjoyable to use. For another four items, quite a number of students disagreed (and strongly disagreed) that the gamified e-portfolio was 'a burden to them'. Figure 7.4 also suggests that more participants disagreed (strongly disagreed) that they felt unhappy, worried and exhausted when using the gamified e-portfolio. However, the number of participants who chose 'neutral' as an answer is open to a number of interpretations, like they genuinely don't have an answer to that question, or the questions did not accurately describe how they felt towards MeP.

### 7.3.3.3 Motivation

*Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?*

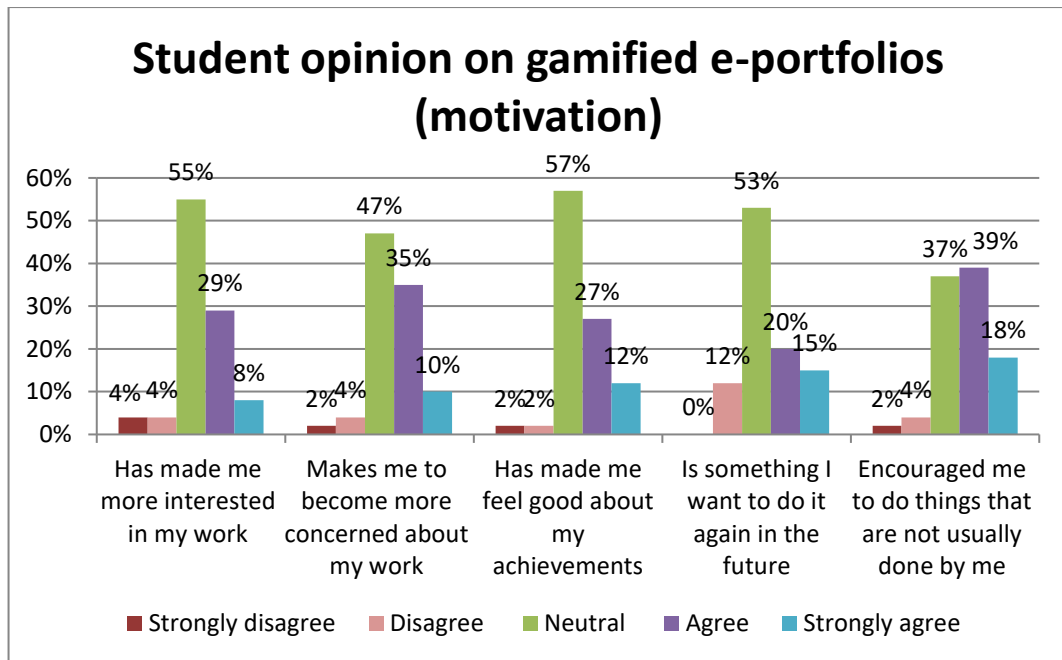


Figure 7.5: Student opinion on gamified e-portfolio – motivation (n=51)

I use five questions to get student opinion on motivation when using the gamified e-portfolios. As we can see in Figure 7.5, all bar charts are skewed to the right which suggests that the students agree (strongly agree) that the gamified e-portfolios made them feel more interested in their work, more concerned about their work, made them feel good about their achievements and want to use it in the future. For the first four items, there were many participants who answer 'neutral' and show that they are very indecisive about how the gamified e-portfolio motivated them.

However, item five which stated that 'gamified e-portfolios encouraged me to do things that are not usually done by me' showed fewer students choosing 'neutral' as an answer. It is interesting to know that gamified e-portfolios do motivate users to do things that are not usually done by them.

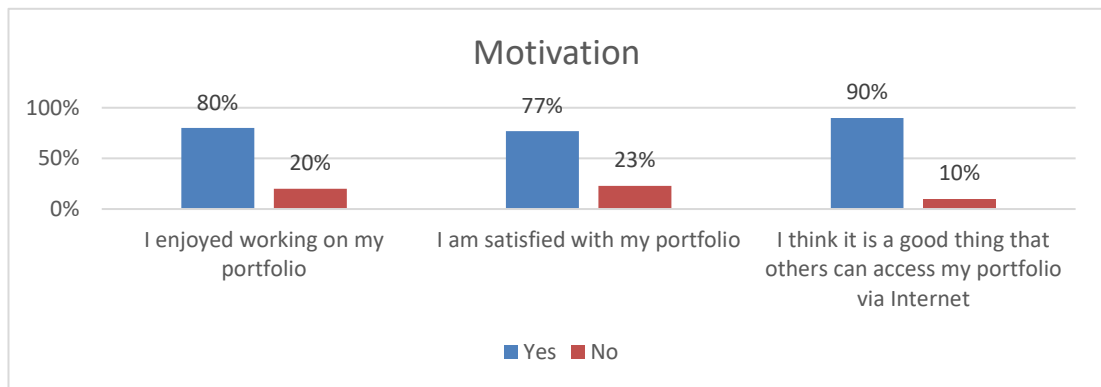


Figure 7.6: Motivation (n=51)

Based on the answers from the user (Figure 7.6), the users did feel a sense of motivation while using the gamified e-portfolio (MeP) because most of the students enjoyed working on their portfolio, satisfied with their portfolio and feel comfortable that it can be accessed by others.

#### 7.3.3.4 Learning

*Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?*

## Student opinion on gamified e-portfolio (learning)

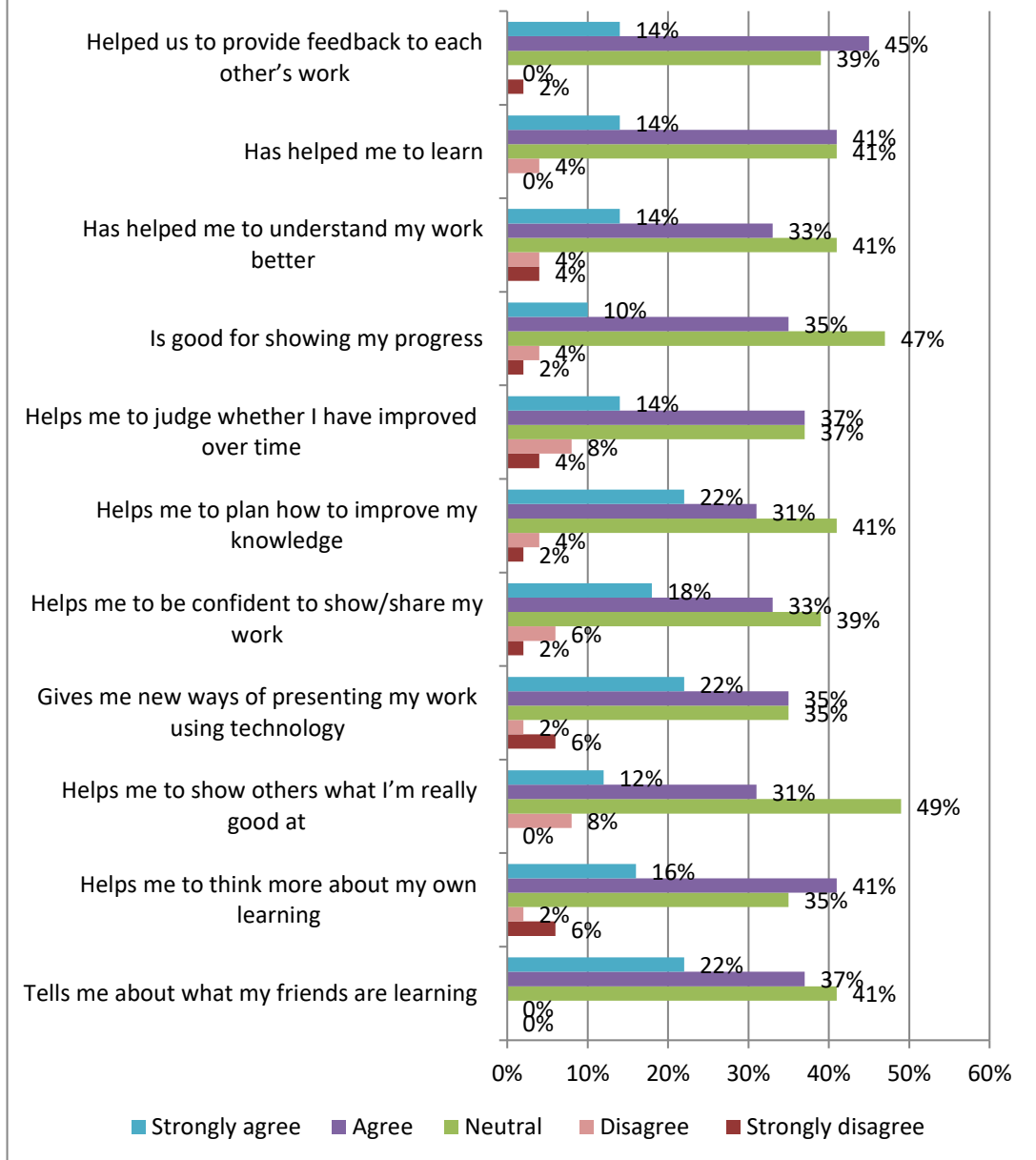


Figure 7.7: Student opinion on gamified e-portfolios – learning (n=51)

Figure 7.7 shows most participants agree that the gamified e-portfolio helped them in learning. However, I face the same problems as there are many participants who could not decide or do not have an answer and chose 'neutral' for most of the questions.

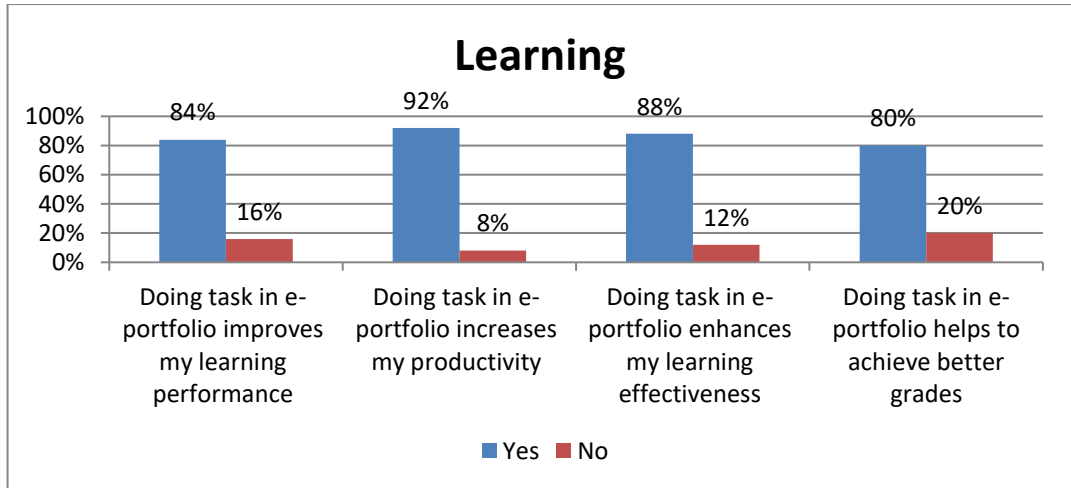


Figure 7.8: Learning (n=51)

Figure 7.8 gives us a clearer picture of users' opinions that the gamified e-portfolio did improve their learning in terms of performance, productivity, effectiveness and achieving better grades.

### 7.3.3.5 Usability

*Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?*

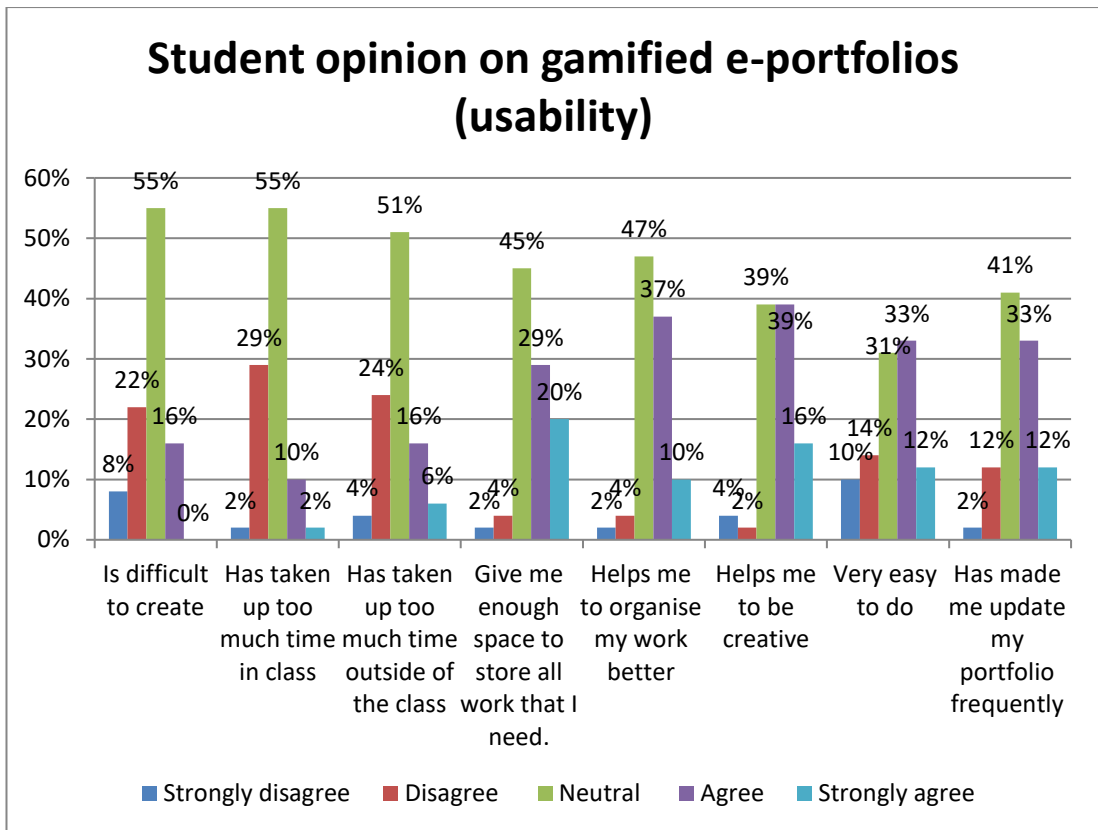


Figure 7.9: Student opinion on gamified e-portfolios – usability (n=51)

I used eight questions (Figure 7.9) to evaluate the usability of the gamified e-portfolio in a 5-point Likert scale form. I do face more ‘neutral’ responses from the participants. However, from the first three questions, if I do not consider the ‘neutral’ answers, it shows that users did not feel that the gamified e-portfolio is hard to create and taking their time inside or outside of the class. So, having an e-portfolio will not affect them in terms of their time and effort. For questions four to eight, users felt that the gamified e-portfolio gave them enough space to store their work, helped them to organise their work and be creative, was easy to use and made them update their e-portfolio frequently.

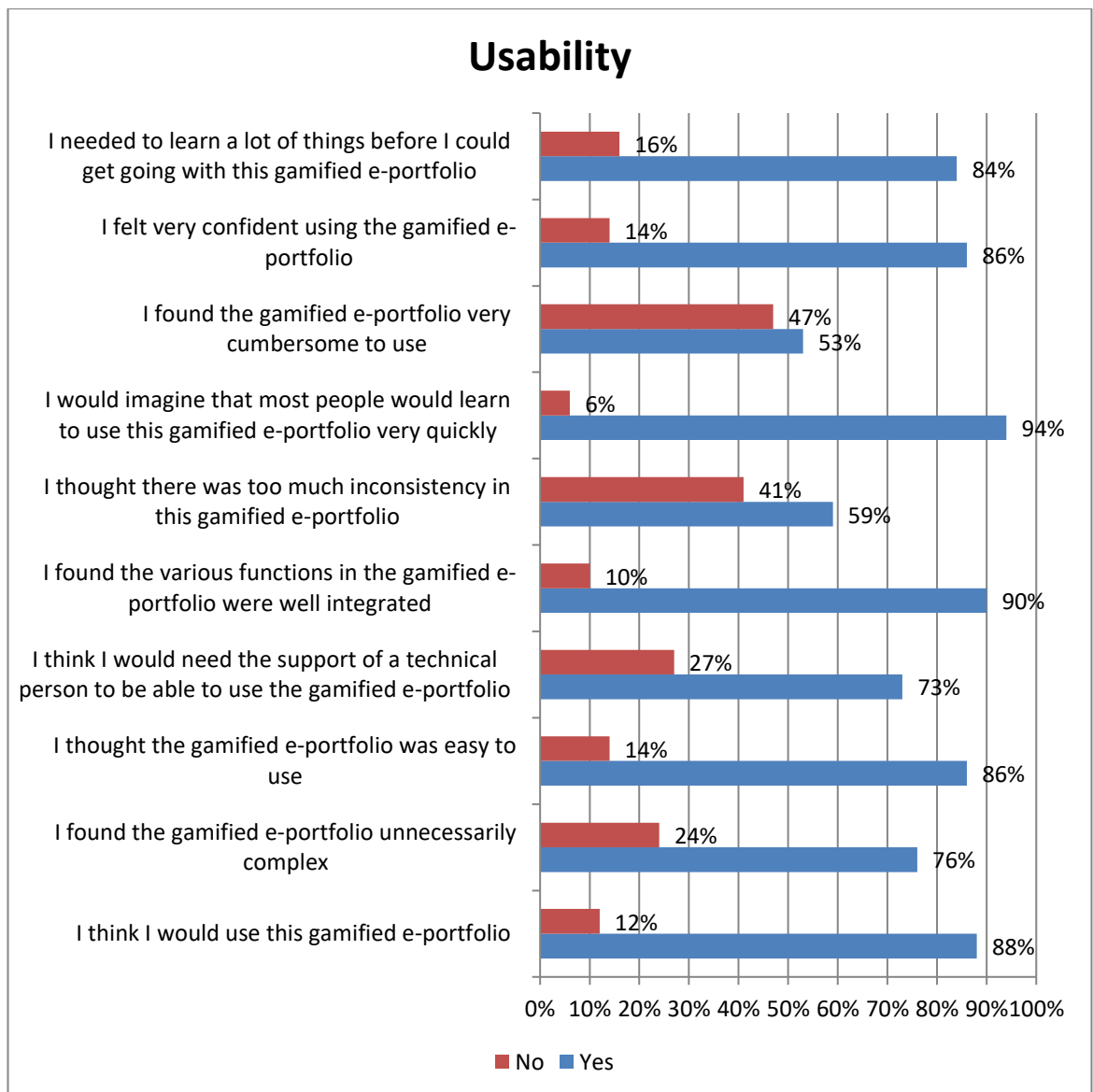


Figure 7.10: Usability (n=51)

In terms of usability (Figure 7.10), the first question 'I found that the gamified e-portfolio very cumbersome to use', the second question 'I thought there was too much inconsistency in this gamified e-portfolio', the seventh question 'I think I would need the support of a technical person to be able to use the gamified e-portfolio' and the ninth question 'I found the gamified e-portfolio unnecessarily complex' show users felt a little bit intimidated by the new gamified application because it was something that they had never used before and they needed proper training to be able to use it with confidence.



### 7.3.3.6 Collaborations

Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?

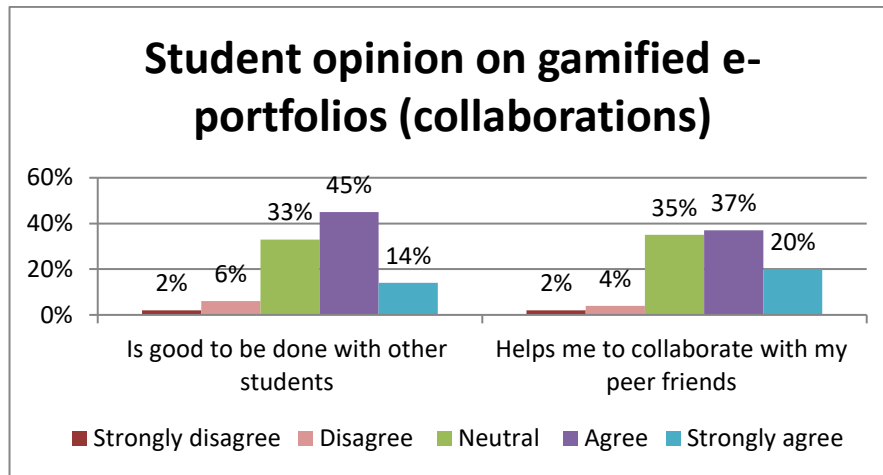


Figure 7.11: Student opinion on gamified e-portfolio – collaborations (n=51)

I only use two questions to evaluate whether the gamified e-portfolio helped the students to work with others. As we can see in Figure 7.11, students did agree that the gamified e-portfolio was good to be done with other students and helped them to collaborate with their peers.

### 7.3.4 Student feedback on the advantages of e-portfolio with “GAMIFIED” elements

When using e-portfolios application, assess how the game elements in the e-portfolio help you to keep using the application? (Use scale 1-5, 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree)

Based on Figure 7.12, most participants agreed (strongly agreed) that the game elements in the gamified e-portfolio encouraged them to communicate with friends and lecturers, encouraged them to upload and share learning evidence in the e-portfolio more often, encouraged them to visit the e-portfolio more often, helped

them to update the e-portfolio via the accumulated rewards points, informed them of their current status via leaderboards, rewarded them (points/badges) when they completed a task, provided the summary of their e-portfolio content that allowed them to know their progress, and provided useful feedback to them to improve their e-portfolio. The participants also agreed (strongly agreed) that the game elements encouraged them to give comments on their friends' artifacts and make them want to compete with their friends to update their e-portfolios, but there were also quite a number of participants who answered 'neutral' for these two items which suggest they were undecided or have no answer for it. There are more participants who answer 'neutral' for the notification period of inactivity to remind them to update their e-portfolio, suggesting that notification of inactivity period would not affect their behaviour in updating their e-portfolio.

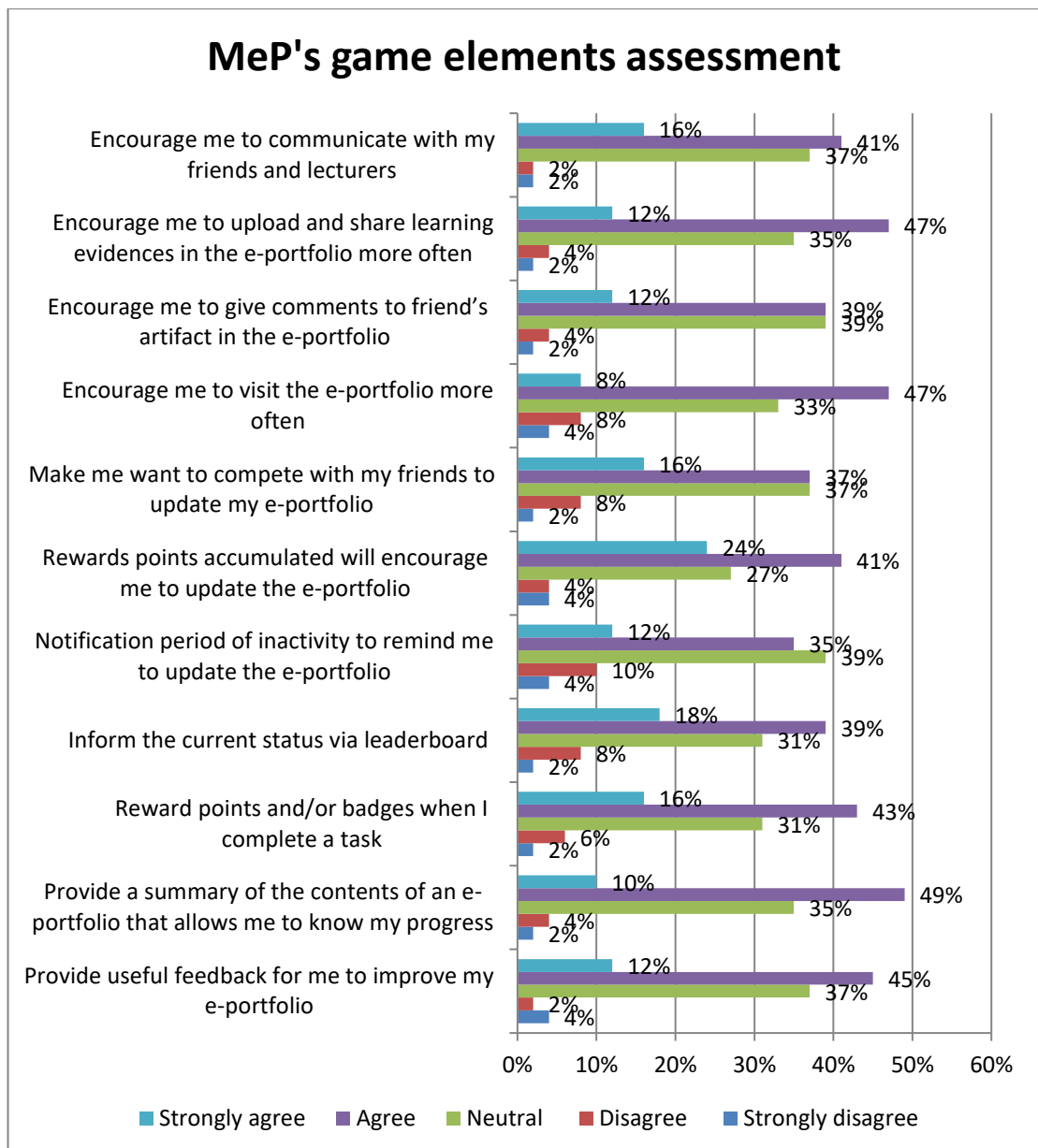


Figure 7.12: MeP's game elements assessment (n=51).

### 7.3.5 Current experiences with e-portfolio creation and development

Most of the students categorised themselves as having acceptable prior experience with portfolios and e-portfolios as they perceived themselves as having already heard of the 'e-portfolio' concept, already knew what 'e-portfolio' means, already knew what should be included in an e-portfolio, and already had a paper-based portfolio of their learning experiences (Figure 7.13). At least more than half of the

participants who had experiences with e-portfolios spend at least 1 hour to update their portfolio daily which suggests participants use the e-portfolios quite frequently.

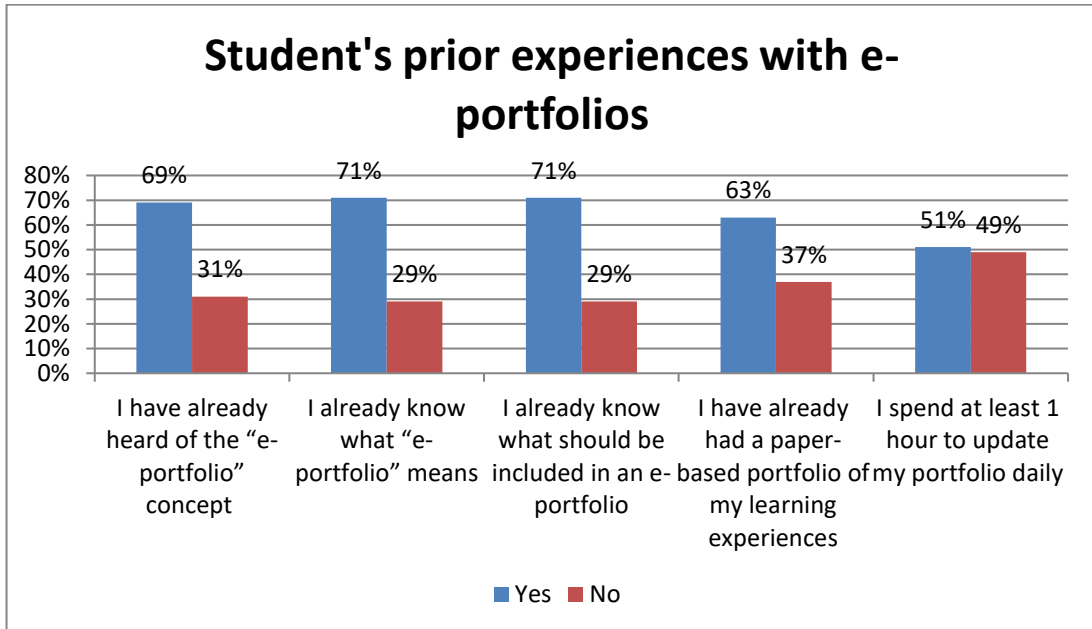


Figure 7.13: Student’s prior experience with portfolios and e-portfolios.

Figure 7.14 further illustrates the participants’ pattern of updating their portfolios. Most of the students would update their portfolios less than monthly (35%) which suggests frequent update were not necessary.

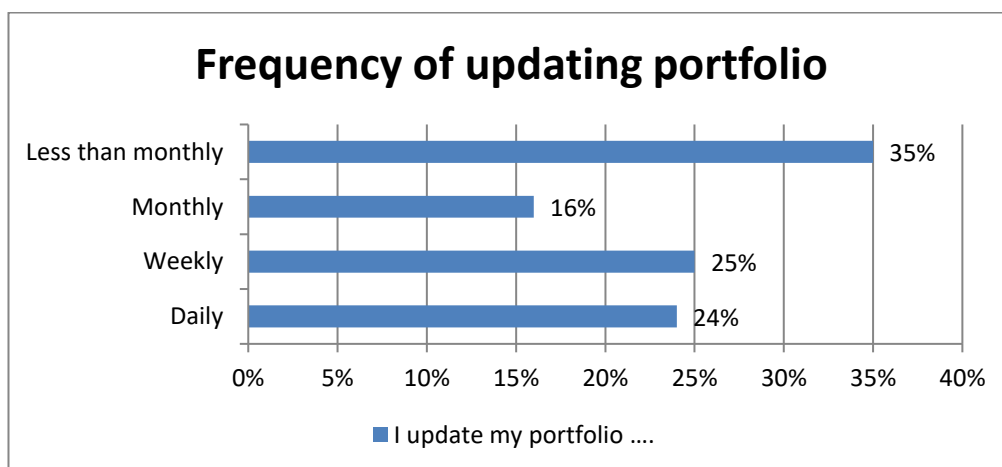


Figure 7.14: The frequency of updating portfolio (n=51).

Figure 7.15 shows the items that the participants thought should be included in an e-portfolio system after using it for some duration. Most of them voted for the profile page. Other items have been voted quite equally except for the notification of inactivity duration and notification of their last update to the e-portfolio content which suggests they perceived these two are less important.

### Items that should be included in the e-portfolios

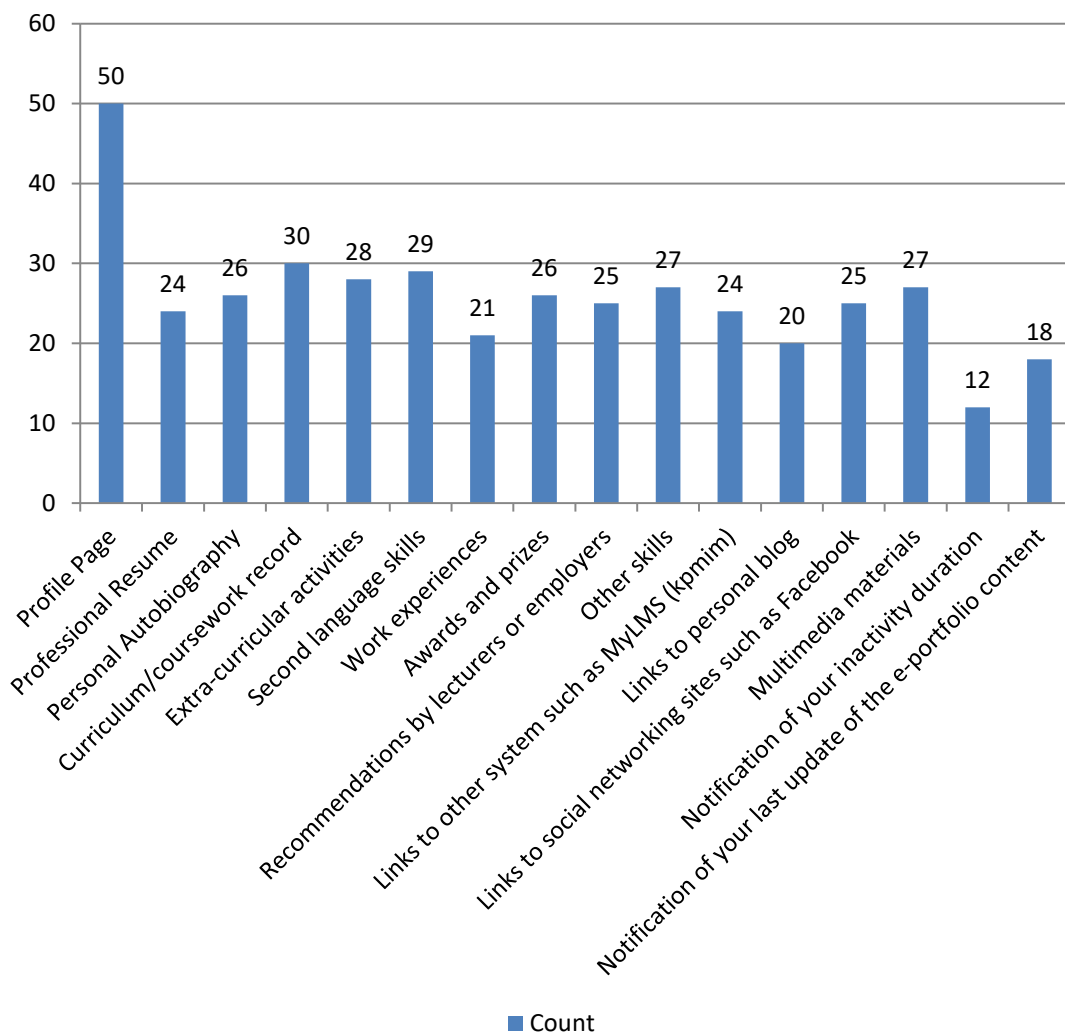


Figure 7.15: Items should be included in the e-portfolios (n=51).

### 7.3.6 Statistical analysis

#### 7.3.6.1 Chi-square test of independence & Phi ( $\phi$ ) coefficient

Chi-square test of independence is a statistical test of the association between two independent dichotomous variables. It tests for whether an association is statistically significant and is not a measure of the strength of association (e.g., it does not inform how strong the association is). However, it has been run in conjunction with Phi ( $\phi$ ), which is a measure of association.

- a. Association between 'Having problem accessing the internet' with 'I found the gamified e-portfolio very cumbersome to use'.

**The null hypothesis,  $N_0$ :** Having problems with the Internet will make the user find the gamified e-portfolio very cumbersome to use.

#### *Sample characteristics*

The Case Processing Summary table (Table 7.3) highlights how many valid and missing cases (e.g., participants) there are, as shown below:

*Table 7.3: Case Processing Summary*

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Internet access evaluation - Do you have problem accessing the Internet? * Usability_I found the gamified e-portfolio very cumbersome to use	51	100.0%	0	0.0%	51	100.0%

As we can see here that all cases were valid ("51" under the "Valid" column) and there were no missing cases ("0" under the "Missing" column).

*Cross-tabulation*

The crosstabulation and observed and expected frequencies for each cell of the design are found in the ‘Do you have a problem accessing the Internet?’ \*’ I found the gamified e-portfolio very cumbersome to use’ Crosstabulation table (Table 7.4), as shown below:

*Table 7.4: Internet access evaluation - Do you have a problem accessing the Internet vs Usability - I found the gamified e-portfolio very cumbersome to use*

			Usability - I found the gamified e-portfolio very cumbersome to use		Total
			No	Yes	
Internet access evaluation - Do you have a problem accessing the Internet?	No	Count	11	8	19
		Expected Count	8.9	10.1	19
	Yes	Count	13	19	32
		Expected Count	15.1	16.9	32

From these results, we can see that for “yes” to ‘Do you have problem accessing the internet’, the observed frequency was somewhat greater than expected for "yes" to ‘I found the gamified e-portfolio very cumbersome to use’, and lower than expected for "no" to ‘I found the gamified e-portfolio very cumbersome to use’, and in "no", the other way around. I suspected that there is an association between these two variables. I will test for this in the next section.

*Chi-square test for association*

The chi-square test for association, are presented in the Chi-Square Tests table (Table 7.5), as shown below:

*Table 7.5: Chi-Square Tests*

	Value	df	Asymp. Sig. (-2-sided)
<b>Pearson Chi-Square</b>	1.427 <sup>a</sup>	1	.232
<b>N of Valid Cases</b>	51		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.94.

b. Computed only for a 2x2 table

*Strength of association*

*Table 7.6: Symmetric Measures*

		Value	Approx. Sig.
Nominal by Nominal	Phi	.167	.232
	Cramer's V	.167	.232
N of Valid Cases		51	

A chi-square test for association was conducted between 'Having problem accessing the internet' with 'I found the gamified e-portfolio very cumbersome to use'. All expected cell frequencies were greater than five (refer to crosstabulation Table 7.4). Therefore, I have an adequate sample size to run the chi-square test of homogeneity.

51 participants with an Internet problem classification were randomly assigned to either they felt the gamified e-portfolio was cumbersome or they did not feel the gamified e-portfolio heavy. The test for two proportions used was the chi-square test of homogeneity. At the conclusion of the gamified e-portfolio, 8 students (42.1%) who did not have Internet problems felt that the gamified e-portfolio was cumbersome while 19 students (59.4%) who had internet problems felt that the gamified e-portfolio was cumbersome, a difference in proportions of 0.173,  $p=0.232$ .

The difference between the two independent binomial proportions was not statistically significant ( $p>.05$ ). Therefore, I fail to reject the null hypothesis,  $N_0$ : Having problems with the Internet would make the user find the gamified e-portfolio very cumbersome to use and cannot accept the alternative hypothesis.



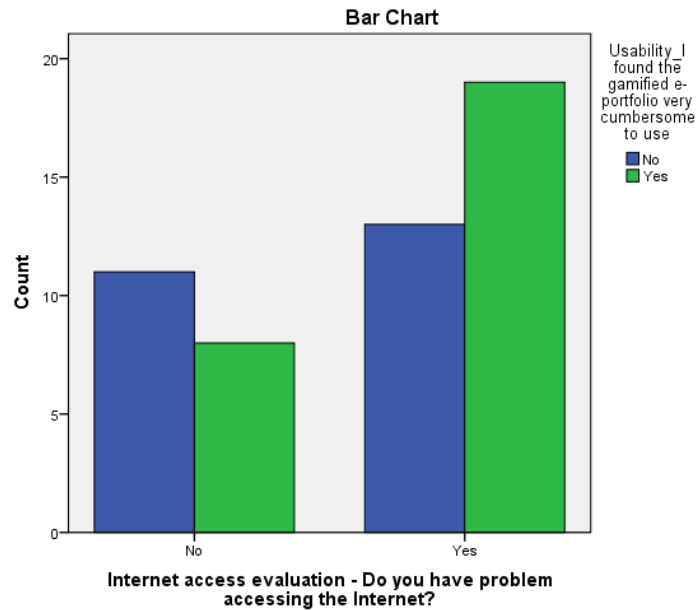


Figure 7.16: Internet access evaluation bar chart

The above bar chart (Figure 7.16) provides a good representation of the association. It shows quite clearly the differences in 'Having problem accessing the Internet' and 'I found the gamified e-portfolio very cumbersome to use'. Therefore, there are possibility that there is relationship between having a problem accessing the Internet and the feeling of the users that the gamified e-portfolio was very burdensome to use.

### 7.3.6.2 Cochran-Armitage test

- a. Association between 'Provide useful feedback for the user to improve their e-portfolio' with 'Doing task in e-portfolio improves their learning performance'.

**The null hypothesis,  $H_0$ :** Doing task in e-portfolio improves user learning performance through providing useful feedback for the user to enhance their e-portfolio.

The Cochran-Armitage test of trend is used to determine whether there is a linear trend (i.e., a linear relationship/association) between an ordinal independent variable and a dichotomous dependent variable. SPSS Statistics does not have a dedicated procedure for running the Cochran-Armitage test of trend, but the result can be obtained using the procedure for a binomial logistic regression. This is because the Cochran-Armitage test of trend is equivalent to the score statistic for testing a single continuous independent variable in a binomial logistic regression model (i.e., a linear logit model) (Agresti and Kateri 2011). As such, I will use the binomial logistic regression procedure in SPSS Statistics to generate the result of the Cochran-Armitage test of trend.

*Table 7.7: Variables not in the equation*

		Score	df	Sig.
Variables	Q40_Provideusefulfeedbackformetoimprovemyportfolio	4.366	1	.037
tep	Overall Statistics	4.366	1	.037
0				

We can see that the p-value is .037. Therefore, because  $p = .037$  and this satisfies  $p < 0.05$ , the result is statistically significant. That is, there is a statistically significant linear trend between doing a task in e-portfolio improve user learning performance and providing useful feedback for the user to improve their e-portfolio.

A Cochran-Armitage test of trend was run to determine whether a linear trend exists between doing the task in e-portfolio improve user learning performance and providing useful feedback for the user to improve their e-portfolio. The classification of providing useful feedback were strongly disagree (n=1), disagree (n=0), neutral (n=16), agree (n=20) and strongly agree (n=6), and the proportion of students who agree with providing useful feedback was 0.500, 0, 0.842, 0.870, and 1.000, respectively. The Cochran-Armitage test of trend showed a statistically significant linear trend,  $p=0.037$ , with a higher level of agreement in

providing feedback for the user to improve their e-portfolio associated with doing the task in e-portfolio improve their learning performance.

Therefore, we can conclude that doing the task in e-portfolio improves user learning performance through providing useful feedback for the user to enhance their e-portfolio.

#### **7.4 Interviews**

There are many options within the type of the interview like:

- Face-to-face interview – it is a one-to-one, in-person interview
- Telephone interview – this type of interview needs a researcher to interview by phone
- Focus group – researcher interviews participants in a group
- E-mail internet interview – researcher, doing the interview via e-mail

In our study, I decided to do a face-to-face interview because participants cannot be directly observed while using the MeP system due to researcher's constraint to be at the colleges during the implementation phase. Advantages of the interview include:

- Useful when participants cannot be directly observed
- Participants can provide historical information
- Allow researcher control over the line of questioning

However, I am aware of the limitations of the interview such as:

- Provide indirect information filtered through the views of the interviewees
- Provides information in a designated place rather than the natural field setting
- Researcher's presence may bias responses
- Not all people are equally articulate and perceptive

I have conducted a semi-structured interview, audiotaped the interview responses, and transcribed the interview findings. The researcher also took notes of any physical responses from the interviewee to support the recorded audio.

The interviews were scheduled from 6th April 2016 to 20th April 2016 in KPMIM that involves 20 participants (students) from the Diploma in English Communication (DEC). The interviews were conducted as a face-to-face session in Malay language and audio recorded. The interview questions were divided into three parts, ice breaking session, game elements perceptions, and usability of the MeP. The questions raised in the interviews were related to the questions in the post-survey questionnaire which covers the demographic information of the participants, students' experiences with portfolio and e-portfolio, students' experiences with computer games and gamification, students' preferences of sharing their work online and receive/give comments to their friends' shared work, the usability of the MeP system, and their perceptions and experiences of the game elements in the MeP system.

#### **7.4.1 Interview Process**

The process of doing the interview started with the design of the interview questions and conducting a pilot test. Please refer to Appendix D for the interview questions and Appendix G for the pilot test questions.

##### **7.4.1.1 Content analysis**

A content analysis was performed on all interview transcriptions. Content analysis is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the context of their use" (Krippendorff 2004). Content analysis can be done with any written material like media products, personal interviews and many more. By using a content analysis, the researcher can analyze texts and make conclusions from it.

Researcher develops a coding sheet with created categories based on what exactly the researcher was looking for in the selected content in order to get accurate results. By creating categories and coding the content, the researcher can detect patterns, themes and begin to generalize by counting the frequencies of codes or the researcher can group codes into more general groups. I used the latter in my research activities. Each interview transcript was analyzed with the same coding sheet to maintain consistency.

The steps of doing the content analysis have been discussed in detail in chapter 3. Below is the example of how I conducted the content analysis.

### **Step 1: Examine sample materials**

In this stage, I examined the sample materials which were the interview transcriptions in order to extract the interpretive comments that have been written on the data. A code/category/descriptor word has been inserted (in capital letters) for each interpretive comment. As mention before, the transcriptions of the interview were done in Malay language to maintain consistency. The sample of the interview transcripts with the code/category/descriptor can be found in Appendix F.

### **Step 2: Create a list of categories/themes**

After the sample materials have been examined, a list of themes/categories was created. These should reflect the aim of the research. The data were sorted into key headings/areas using the given codes. The codes that have been used fall into five main categories:

- a) Participant's background and portfolio experiences (BACKGROUND)
- b) Usability of the gamified e-portfolio systems (USABILITY)
- c) Game elements in the e-portfolio systems (GE)
- d) Social elements in the e-portfolio systems (SE)

e) Ownership and control of the e-portfolio systems (OC)

I showed the created themes/categories and how they addressed the research questions through the mapping of the research questions to the higher order themes (content areas) of the interview data (Table 7.8).

*Table 7.8: Mapping of research questions with higher order themes of the interview data content analysis*

<b>Research questions</b>	<b>Sub research questions</b>	<b>Higher order themes (content areas)</b>
RQ3: How usable and useful will students find the game elements in the e-portfolio system?	RQ3.1: Do points, badges and leaderboard make users want to update their e-portfolio content?	(GE)Game elements-effects, opinion, motivation (USABILITY)Usability-usage
	RQ3.2: Do points, badges and leaderboard improve user visits to the e-portfolio system?	(GE)Games elements-effects, opinion, motivation (USABILITY)Usability-usage
	RQ3.3: Do points, badges and leaderboard increase frequency of users updating their e-portfolio content?	(GE)Game elements-effects, opinion, motivation (USABILITY)Usability-usage
	RQ3.4: Do points, badges and leaderboard encourage users to share more artifacts in their e-portfolio?	(GE)Game elements-effects, opinion, motivation (USABILITY)Usability-usage
	RQ3.5: Do points, badges and leaderboard encourage users to give more feedback to others' artifacts in an e-portfolio system?	(GE)Game elements-effects, opinion, motivation (USABILITY)Usability-usage
RQ4: How can the implemented game mechanics (points, badges, leaderboard) increase user intrinsic values?	RQ4.1: Do points, badges and leaderboard make users feel a sense of satisfaction?	(GE)Game elements- feelings, opinion, motivation (USABILITY)Usability-usage
	RQ4.2: Do points, badges and leaderboard make users feel a sense of achievement?	(GE)Game elements- feelings, opinion, motivation (USABILITY)Usability-usage
	RQ4.3: Does getting a reward (points, badges) after completing a task/activity motivate a user to update their e-portfolio content?	(GE)Game elements- effects, opinion, motivation (USABILITY)Usability-usage
	RQ4.4: Does getting a reward (points, badges) after completing a task/activity encourage a user to participate/interact more with an e-portfolio system?	(GE)Game elements- effects, opinion, motivation (USABILITY)Usability-usage
RQ5: Do the social elements (blog, groups, and forum) encourage users to connect and collaborate with each	-	(SE) Social elements – opinion, collaboration (USABILITY) Usability - usage

Research questions	Sub research questions	Higher order themes (content areas)
other?		
RQ6: Do users feel that they have control of their portfolio?	-	(OC) Ownership and control – opinion (USABILITY) Usability - usage

*NOTES: Any emerging higher order themes should be included in Table 7.9*

To be able to group the data into appropriate themes/categories, I need a clear description of each theme/categories. Below is the description of each identified themes and category (Table 7.9).

*Table 7.9: Themes/categories general description*

Content areas	Categories	Meaning (very brief)	Evidence from the data (very brief)
Participant's background	Personal details Portfolio experiences Interest towards computer games Gamification experiences Work sharing preferences Feedback of shared work preferences	Features of participants including participant's personal details and academic background, portfolio and e-portfolio experiences, computer games interest, gamification experiences, work sharing preferences, and participants' viewpoint of giving and receive comments.	Participants' name, course, semester of study, portfolio and e-portfolio experiences, like to play computer games, gamification experiences, like/don't like sharing work online, and like/don't like to receive and giving feedback to shared materials, can improve, useful, negative, positive
Usability of the e-portfolio systems	e-portfolio usage Ease of use of the e-portfolio systems Type of activities done in the e-portfolio systems Visited page(s)	Usable, easy to use, fit the purpose, easy to learn, engaging, efficient, effective, error-tolerant, user-centred, easy to understand	Duration, frequency, recency

Content areas	Categories	Meaning (very brief)	Evidence from the data (very brief)
	<p>in the e-portfolio system</p> <p>Relationship of the e-portfolio system with user personal development activities</p>		
Game elements	<p>Basic understanding of the game elements</p> <p>Opinions about games element in the e-portfolio systems</p> <p>Feelings (emotions) about games element</p> <p>Effects of the game elements towards participation, engagement, motivation and behaviour</p> <p>Overall perceptions of game elements in e-portfolio</p>	<p>Can define what is game elements, can give examples of game elements</p> <p>Participants' viewpoint of games element, results of games element, change of behaviour</p> <p>Participants' sentiments, feelings, reactions, excitements and sensations</p> <ul style="list-style-type: none"> <li>- From participants' viewpoint</li> <li>- From researcher viewpoint</li> </ul> <p>How the game elements influence a user to participate and use the e-portfolio systems</p> <p>Participants viewpoint of game elements in the e-portfolio systems:</p> <ul style="list-style-type: none"> <li>- Positive</li> <li>- Negative</li> <li>- Suggestions/potential use</li> </ul>	<p>Fun, enjoy, excitement, sense of achievement, satisfaction, boring, complicated, motivate, compete, good, engaging, motivating, influence, do more, complete task, frequent visit</p>



Content areas	Categories	Meaning (very brief)	Evidence from the data (very brief)
Social elements	Aware of the blog and forum features.	Participants' awareness of the blog and forum features.	Usage of the blog and forum features.
	Opinions about social elements in the e-portfolio systems	Participants' sentiments, feelings, reactions, excitements and sensations.	Fun, enjoy, excitement, satisfaction, boring, complicated, motivate, collaborate, communicate, discuss, good, engaging, motivating, influence, do more, complete task, frequent visit
Ownership and control	Feel in control	Participants' feeling based on their activities of creating and managing their e-portfolio content.	I can do what I want (add, remove, share content)
	Feel sense of ownership	Participants' feeling that they own the e-portfolio.	Able to create, manage and control the e-portfolio content
Suggestion to improve	Suggestion for help features	Participants' recommendation for guidelines	More information, guidelines
	Suggestion to further gamify the e-portfolio systems	Participants' recommendation to add more games element	Visible signs of progress through simple graphical statistics, more challenge

**Step 3: Work through the material counting how often each of the categories appears**

In this step, I went through each of the transcripts and counted how often each of the categories appears in the coded transcripts. All information was recorded and summarized carefully. I did not translate the language from Malay to English to maintain the consistency. The translation only took place at the end of the process of the analysis to be described in the findings section. Sample of the work can be seen in Appendix G.

#### **Step 4: Examine the categories and frequencies looking for patterns and themes**

In this step, I listed the topics within each key area/heading and put frequencies in which items are mentioned. This activity was done for each category to look for patterns and emerging themes that came out from the responses. The example of the data coding sheet is in Appendix H.

#### **Step 5: Draw conclusions about behaviour**

The results presented are organized into predefined key themes that emerged from the analysis of data gathered from the post-survey results and the interview itself. There were five main themes discovered from the data. The main themes are participant's background, the usability of the gamified e-portfolio systems, the user perceptions of the game elements in the e-portfolio systems, the user perceptions of the social elements in the e-portfolio system, and the user perceptions on the ownership and control of the e-portfolio systems. The section below contains detailed information about the findings of the interviews.

### **7.4.2 Findings**

#### *Theme 1: Participant's background (BACKGROUND)*

The findings from the interviews support and confirmed the results from the post-survey that more female students had participated in the study. As for the academic background of the participants, all participants were from a semester 4 Diploma in English Communication (DEC) at Kolej Profesional MARA Indera Mahkota (KPMIM), Kuantan, Malaysia. Because the nature of the study was voluntary, it was beyond our control to get more diverse participants to respond to the interview requests. I summarized the participants' background finding from the interviews:

a) Demographics/background

- Personal background – including participants' name and gender
- Academic background – including participant's course and semester of study

b) Portfolio experiences

- Most of the students had already owned a paper-based portfolio like a file and folder where they kept their learning materials and evidences. However, they did not realize that it is a paper-based portfolio. Other than that, the students kept their learning materials in their computers, laptops or in the cloud storage.
- Only a small number of the students had created and developed an electronic portfolio. What they currently had was a file-based collection of learning materials.

c) Computer Games

- Most of the students were really interested in playing computer games. The reasons why they like computer games varies like to fill their free time with some fun activity, an activity for a diversion of attention from a stressful life of a student, it is fun, and they just like it.
- Only a small number of students shown less interest to play computer games because they like to do other activities.
- All of the students who participated in the study had experiences playing computer games. Several them are avid gamers.

d) Educational games

- Most of the students had experiences playing educational games.

- Only a very small number of students had no experiences playing educational games.

e) Gamification applications

- Several of the students had experiences using gamification application.
- Most of the students think gamification of education is good to make learning more fun and engaging.

f) Opinion on sharing work online

- Most of the students prefer to share their work online because they can gain feedback from others and they think knowledge sharing is good in learning.
- Only a small number of students prefers not to share their work online because of security reasons and they express their concern of plagiarism. They are worried that others might plagiarise their work.

g) Opinion on giving feedback/comments to a shared work

- Most of the students prefer to give feedback/comments to their friend's work because they think it is a gesture of support to their friend's effort in learning.
- Only a small number of students prefer not to give feedback/comments to avoid misunderstanding, or it is just because they are the type of person who did not like to give comments to another people's work.

## *Theme 2: Usability of the gamified e-portfolio systems (USABILITY)*

### a) MeP usability

- Most of the students visit the MeP system weekly. The frequencies of the MeP visits in a week varies from once a week to 6 times a week at the most, depending on the works that needed to be done in the MeP.
- Most of the students spent around 5 to 10 minutes per visit to 1 to 3 hours per visit. Usually, if they visit the MeP frequently, they will spend less time using it and vice versa.
- In terms of the ease of use, most students agreed that it is easy to learn, easy to understand, and easy to use system because MeP has a very simple user interface.
- However, some of the participants faced some difficulties while registering as a new user. This difficulty was due to the 'brute-force' attack that I faced earlier in the implementation phase that made us apply the higher level of security to protect the data in MeP.
- All of the students who participated in the interviews agreed that their time spent in MeP worth the visit.
- The activities that have been done by the participants in the MeP including read MeP content, participated in the forum discussion, upload materials, communicate with friends, and blogging and updating profile and status.
- The most frequently visited pages were Forum, MyProfile, and the leaderboard pages.

### *Theme 3: Game elements in the e-portfolio systems (GE)*

#### a) Game elements

- After using the MeP, most of the students understand what game elements are.
- All of the students think game elements in MeP is good for them and can motivate them to participate more.
- Their feelings of game elements in the MeP system – at first they were confused because they will get rewarded with a point after completing an activity. Then, after they understand the features of MeP and how it works, they feel excited to get points and badges and feel the system is fun. They try to collect more points and badges by adding more materials, make friends, complete the given tasks and communicate with their friends to compete with their friends. They feel a sense of achievement by looking at their collected points and badges, made them feel sense of satisfaction that their work being rewarded, and it is good at showing their progress.
- Effects of game elements towards behaviour – it make the students want to compete among themselves. Other than that, they want to collect more points to be in the leaderboard. They feel curious on what activities or tasks in the system that will give them points/badges and keep on exploring. The game elements influence the students to upload materials, participate in the forum discussion, update and manage their e-portfolio content, give feedback to their friends' activities and/or learning materials that have been shared and encourage to visit the system frequently.

#### *Theme 4: Emerging themes from the interviews*

##### a) Opinion on the social elements of the gamified e-portfolios

- Convenient - the forum, group and blog enable the users to communicate online without having to have a face-to-face meeting.
- Platform to express their feelings and opinion – they can express their feelings and opinion openly.
- Platform to make new friends – the add friends features enable them to make more friends outside of their classroom.

##### b) Will use MeP for personal development

- All the students who participated in the interview said that they would use the MeP for their personal development activities.

##### c) Opinion on gamified e-portfolio/MeP

- Good for engagement and motivation.
- Positive feedback – think that the system will be successful if it is implemented. The students suggested that it should be implemented and use by all KPM institutions as it can be a platform for knowledge sharing and communication.
- Innovative – the game elements made the system more interesting and less boring.
- Creative – in terms of attracting the users to use the system by using the game elements
- Interesting – as the game elements also applied element of surprise.
- Fun to get rewarded.

##### d) Suggestions to improve MeP

- Add more graphics and sounds to make it more interesting.
- Less formal content and design
- More participation from lecturer
- KPM-wide usage
- Introduce an e-voucher (virtual rewards) that can be change to a real voucher (physical rewards) to motivate students to participate more.

## **7.5 Conclusion**

Based on the results collected through the post-survey and the interviews, we can conclude that the MeP system and the game elements inside the MeP system somehow increase user motivation and engagement to use the e-portfolio. Furthermore, the social elements make the system more engaging and improve collaboration among users.

## **7.6 Chapter Summary**

I started this chapter with the introduction followed by the description of the post-survey. In the post-survey description, I have listed the post-survey aims and objectives and methodology. Then I presented the post-survey findings that include the demographic information of the participants, student feedback on the advantages of the e-portfolio system, student opinion on the 'gamified' e-portfolio system, student feedback on the advantages of the e-portfolio with the 'gamified' elements, student's current experiences with the e-portfolio creation and development, and the statistical analysis. Then, I moved forward to discuss about the interviews. In this section, I detailed out my discussion about the interview process and the interview findings. Next chapter (chapter 8) will discuss about



Warwick student's perception of the gamified e-portfolio. The discussion will begin with the introduction of the survey, the aims and objectives of the survey, methodology used, the design and findings of the survey followed by the discussion of the results, conclusion and the chapter summary.

## Chapter 8

### Warwick Student's Perception of Gamified e-Portfolio

In the previous chapter (Chapter 7), I have discussed about Kolej Profesional MARA (KPM) students' perceptions of the implemented gamified e-portfolio system (MeP). This chapter will present the results of the Warwick survey. The aimed of this survey is to get Warwick students' opinions about the existing e-portfolio application, Warwick MyPortfolio, and their perceptions of gamification approach (if it is applied) to that e-portfolio application to increase user motivation and engagement. The results of the survey are hoped to give insights from Warwick students' perspectives of the gamification of the e-portfolio system.

#### 8.1 Introduction

KPM is an example of higher education institutions in Malaysia (a developing country) that has never used any e-portfolio system before with a limited internet access and unstable internet connections and basic infrastructure as compared to the well-equipped higher education institutions such as Warwick University, UK. In order to explore the potential of the gamified e-portfolio in a different educational institution environment such as Warwick, this chapter will present Warwick student's perception of a gamified e-portfolio. This survey is similar to the preliminary survey that has been done in KPM before the implementation phase of the MeP in KPM. However, the participants' background is slightly different because Warwick University has already used an e-portfolio system named Warwick MyPortfolio while KPM has none.

Warwick MyPortfolio is an e-portfolio based on Mahara, the popular open source product which can be used for academic or personal purposes. With Warwick MyPortfolio, users can write journals, create CV, to-do lists and pages that can be shared with the user preferred audience. However, Warwick University does not

make it compulsory for Warwick students to register and create an account with Warwick MyPortfolio as they feel students should have their freedom of choice of whatever tools that they want to use to assist in their learning journey. Warwick students are only encouraged to create their Warwick MyPortfolio, which means participants from Warwick University can be a combination of students who have experience using an e-portfolio system and students who do not have experience using the e-portfolio system. As it is not compulsory for every student to create and use the e-portfolio system, it has been a challenge for the university to encourage the students to register and use it to assist their learning journey. Other than that, there is also another e-portfolio system in some of the departments like in the Computer Science Department.

## **8.2 About Warwick Survey**

The discussion of Warwick survey includes the aims and objectives, methodology used, the results, discussion of the results, and the conclusion from the survey.

### **8.2.1 Aims and Objectives**

The purpose of the Warwick survey is to get students' opinions about the existing e-portfolio application and their perceptions of gamification approach (if it is applied) to that e-portfolio application to increase user motivation and engagement. Information such as participants' background information, internet access evaluation, computer skills evaluation, e-portfolio experiences and student perceptions of game elements (if applied in Warwick MyPortfolio) were collected and analysed.

The results of the survey are hoped to give insights from Warwick students perspectives of the gamification of the e-portfolio system.

## **8.2.2 Methodology**

The methodology for gathering the research data is by using online survey. It is a quantitative data. The data will come from the University of Warwick students who volunteer to participate. While this is not a representative sample of all the population of the University of Warwick, it gives understandings which can benefit those who want to design and develop such an e-portfolio application.

In order to get as many responses as I can, I delivered the online survey to many students from various departments through e-mail and even through announcement from their lecturers after classes about the study and the link to the online survey. However, due to the voluntary nature of the survey, it was so challenging to get Warwick students to take part in the online survey even though I did try to send a follow-up email to remind them. I tried to reach through the departments and lecturers, but still, the number of students who were willing to participate was quite small. Therefore, I only manage to get 34 participants to answer the online survey questions. They were given an option to watch a simple presentation about Warwick MyPortfolio and the proposed gamified e-portfolio before answering the survey questions. The reason why I prepared a simple presentation about Warwick MyPortfolio and the proposed gamified e-portfolio because I took into consideration of the possibility of the students who do not have any experiences in using the e-portfolio system to get an idea of what an e-portfolio system is and how the gamified e-portfolio differs from the traditional e-portfolio that the university currently offering.

### **8.2.2.1The Warwick Survey Design**

The Warwick survey started with an introductory page about the e-portfolio surveys. The participation was voluntary. The responses are remaining strictly confidential. The questionnaire was divided into five sections.

**E. Demographics.**

This section was designed to collect the background information covering age, gender, nationality, previous country of study (if not in the UK), university, department, degree title, degree level and year of study.

**F. Internet Access Evaluation.**

This section consisted of six (6) items and was designed to collect data about the students' Internet access and internet skills. This information is necessary for the researcher to know whether the participants have constraints to access their e-portfolio system or not.

**G. Computer Skills Evaluation.**

This section had three (3) items. It was designed to collect data about students' computer skills.

**H. E-portfolio Experiences.**

This section had ten (10) items and was designed to collect data about students' e-portfolio experiences.

**I. Students' Perceptions of Game Elements if Applied in Warwick MyPortfolio.**

This section had fourteen (14) items and was designed to collect data about students' perceptions of game elements if applied in Warwick MyPortfolio system.

The consent statement has been located at the beginning of the online form that stated, students are considered agree to participate if they complete the survey and submit their responses.

### 8.3 Warwick Survey Results

The Warwick survey was conducted to get students' perceptions of the Warwick portfolio system and the possibility to integrate several game elements to improve user engagement and motivation to use it. This survey was carried out from 1 September-1 November 2016 (8 weeks) from voluntary participants in Warwick University. The findings were based on online questionnaires answered by the students from various backgrounds. The questions were prepared in English.

#### 8.3.1 Findings

The collected quantitative data have been analysed using suitable descriptive and statistical analysis in SPSS 22. They were 34 participants from various background who have decided to participate in the research and completed the online survey. The participant's' demographic information can be seen in Appendix K.

##### 8.3.1.1 Internet access evaluation

*Table 8.1: Internet access evaluation*

Items	n=34			
	Yes		No	
	Count	%	Count	%
Do you have Internet access at home?	33	97.1%	1	2.9%
Do you have Internet access at your institution?	34	100%	0	0%
Do you have problem accessing the Internet?	0	0%	34	100%

For the Internet access evaluation in Table 8.2, the figures suggest that most of the participants have Internet access at home (97.1%). All respondents have Internet access at their institutions and do not have a problem accessing the Internet, which shows Warwick students do have a very good Internet access at the university.

Figure 8.1 shows that the students rated their Internet access as acceptable (32%), good (35%) and very reliable (32%).

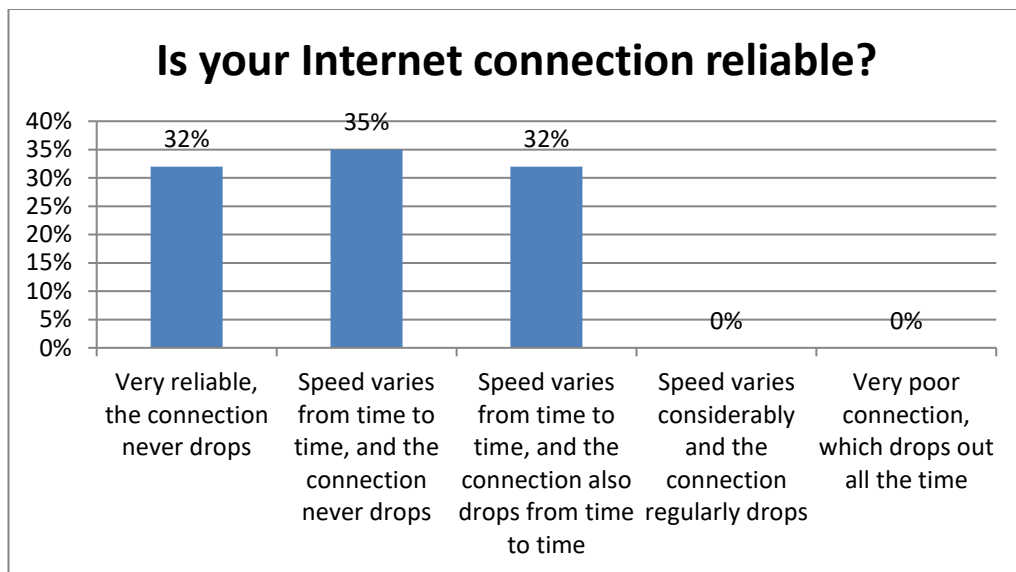


Figure 8.1: Internet reliability

Figure 8.2 shows that Warwick all students who participated in the survey use the Internet daily which suggests that the internet is important to them and they need to use it daily.

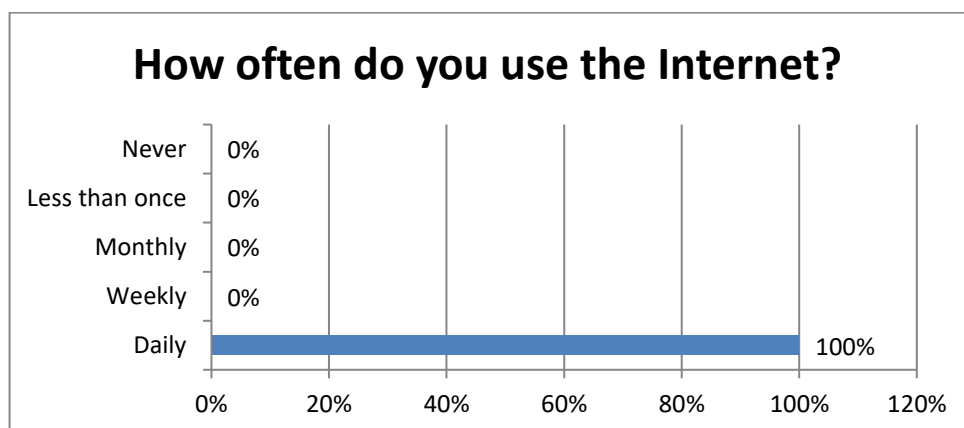


Figure 8.2: Frequency using the Internet

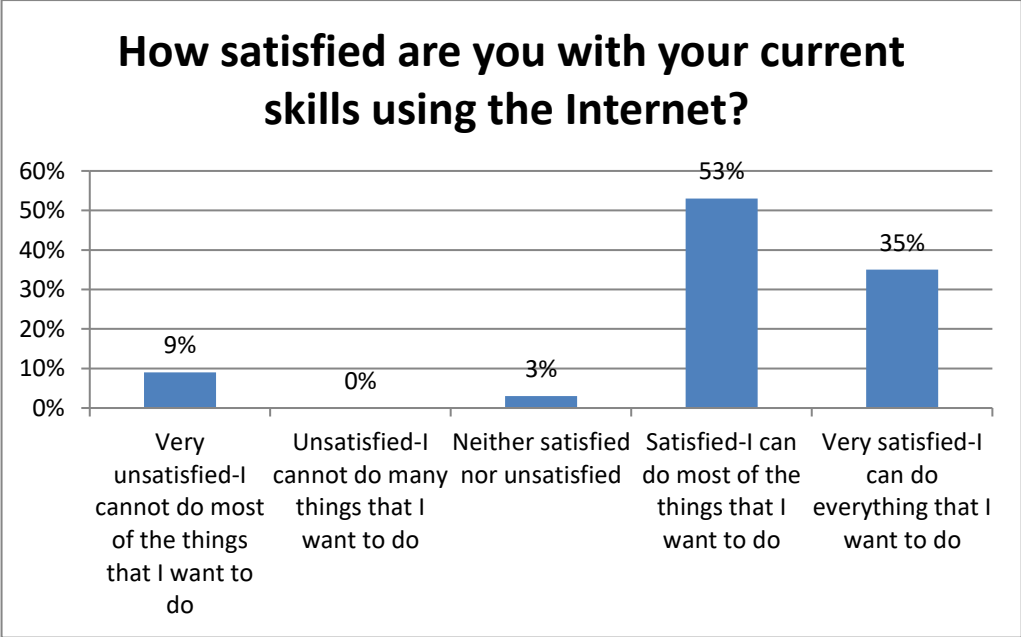


Figure 8.3: Internet skills satisfaction

Figure 8.3 shows that most of the students are satisfied (53%) to very satisfied with their Internet skills (35%). However, there are a few students who are very unsatisfied with their Internet skills.

**8.3.1.2 Computer skills evaluation**

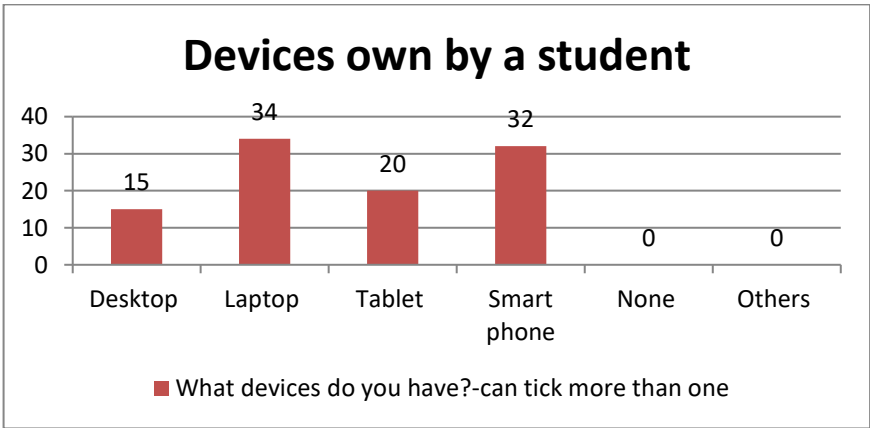


Figure 8.4: Devices owned by a student.



For this question, students can tick more than one device. In Figure 8.4, most students owned a laptop, followed by smartphones, tablet and desktop. This suggests students nowadays have more access to various type of mobile devices compared to a fixed terminal device like a desktop to do their work. Other than that, the figure shows most students owned more than one device.

As for computer skills among students (Figure 8.5), most students are confident (41%) and very confident (56%) using their desktop or laptop. Only one (3%) student answered neither confident nor unconfident which suggest the students have experience in using computers and are quite confident using it.

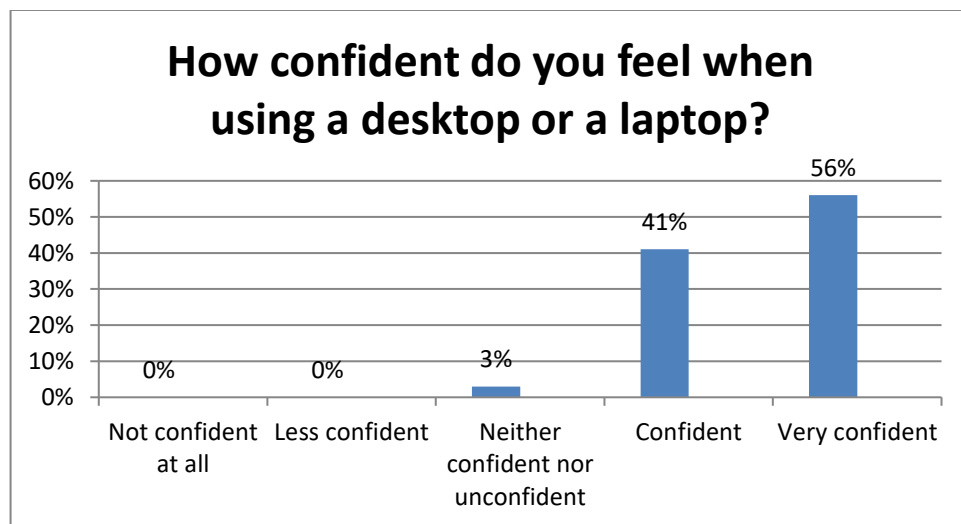


Figure 8.5: Confidence using a desktop or a laptop.

Figure 8.6 shows they prefer using their laptop to update their Warwick MyPortfolio followed by the desktop. Participants who answered 'Others' are the one who was not using the e-portfolio.

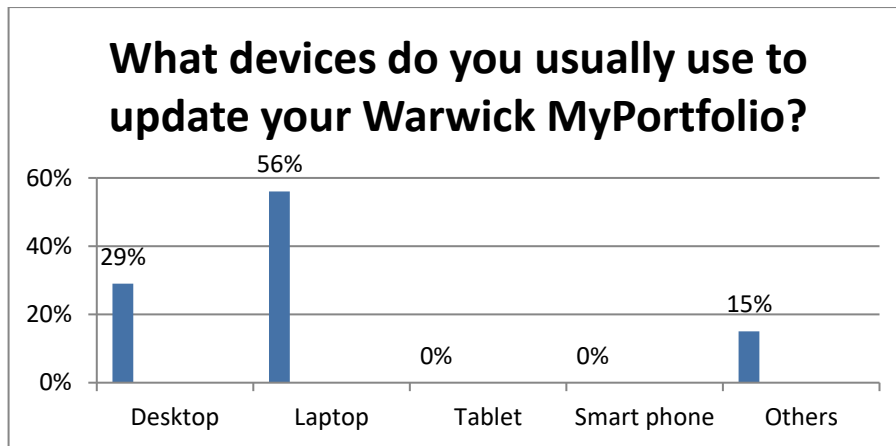


Figure 8.6: Device a student usually used to update their Warwick MyPortfolio.

### 8.3.1.3E-portfolio experiences

Table 8.2: Warwick MyPortfolio experiences.

Items	n=34			
	Yes		No	
	Count	%	Count	%
Do you know about Warwick MyPortfolio before this?	27	79.4%	7	20.6%
Have you attended any course (module)/training/seminar/workshop about Warwick MyPortfolio before?	12	35.3%	22	64.7%

For Warwick MyPortfolio experiences, more than half of the students knew about Warwick MyPortfolio (79.4%), but most of them have never attended any course about Warwick MyPortfolio (64.7%). Furthermore, most of the students do not use Warwick MyPortfolio (59%) despite knowing about it as shown in Figure 8.7 below.

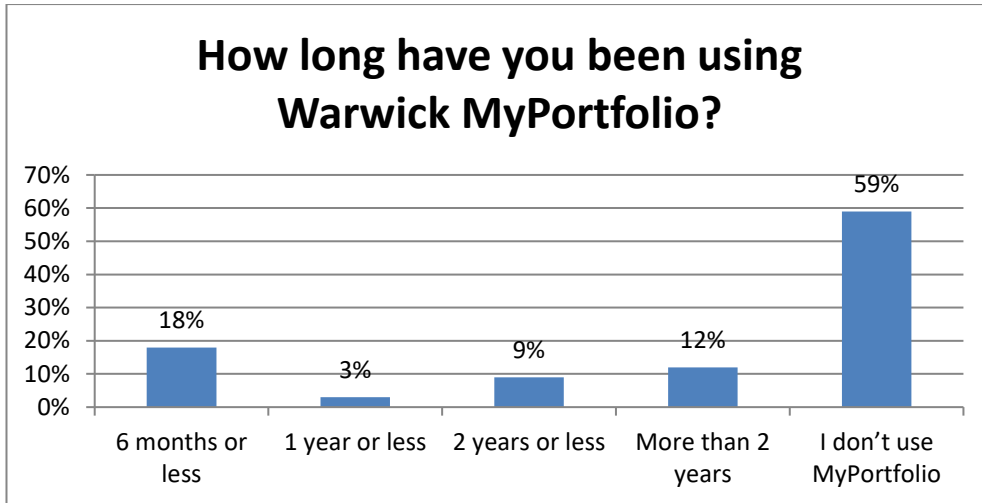


Figure 8.7: How long have you been using Warwick MyPortfolio?

Figure 8.8 illustrates the reasons why the students did not use Warwick MyPortfolio. Most of them said 'I don't have time to use it' (11 participants) followed by 'It is not compulsory' and 'I don't need it' (8 participants) which suggest they do not feel Warwick MyPortfolio will give them benefits in their learning. 7 participants have other reasons, 5 participants said, 'It is not interesting' and 2 participants said, 'It is cumbersome'.

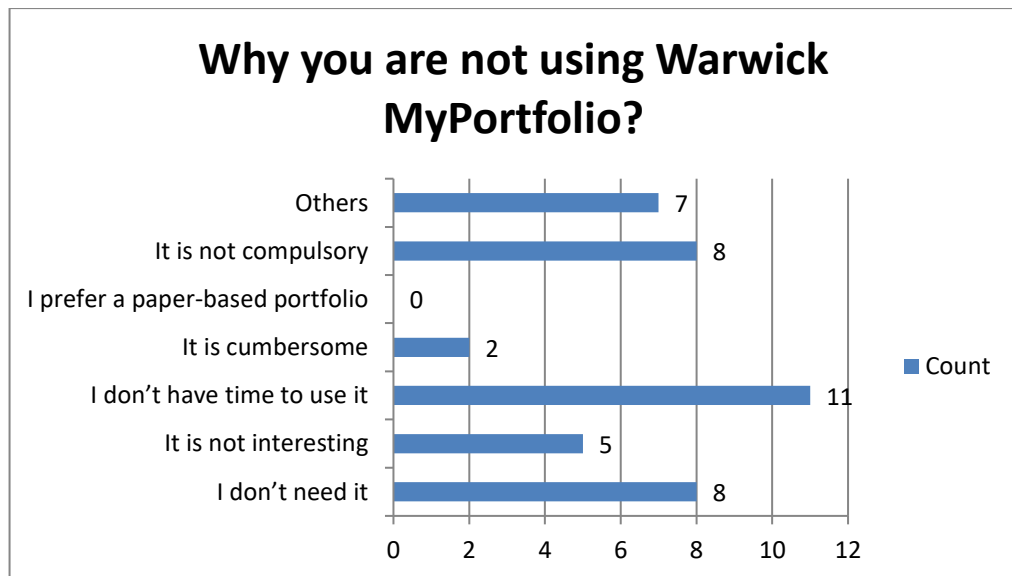


Figure 8.8: Why you are not using Warwick MyPortfolio?

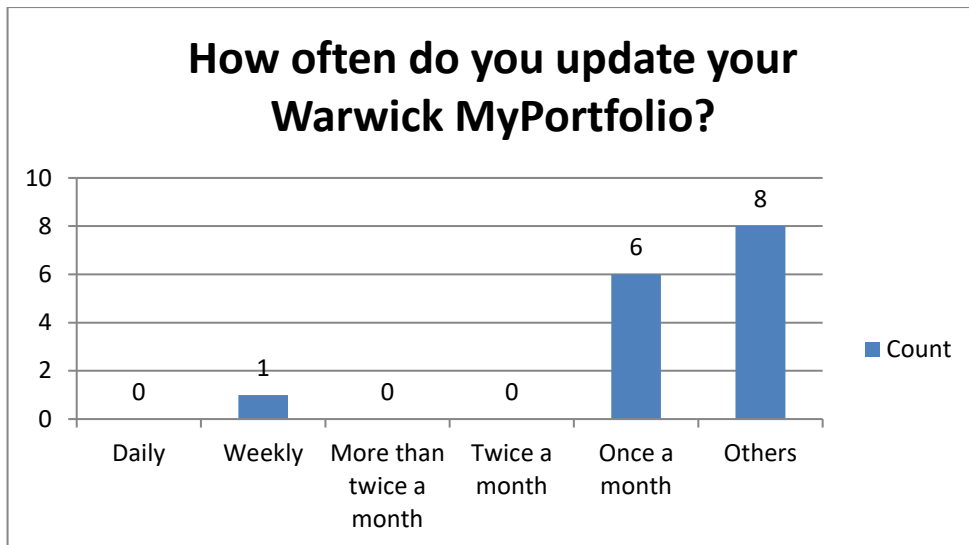


Figure 8.9: How often do you update your Warwick MyPortfolio?

For those who have a Warwick MyPortfolio account, they did not visit it frequently as shown in Figure 8.9. This suggests they did not update their portfolio content as frequently as they should.

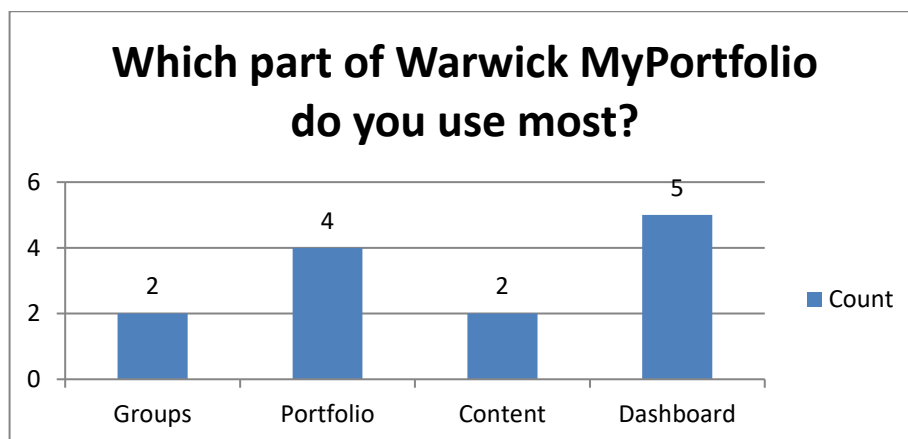


Figure 8.10: Which part of Warwick MyPortfolio do you use most?

Figure 8.10 suggests the students only do a very brief visit as they use the MyPortfolio dashboard the most, followed by the portfolio area, groups and content areas of Warwick MyPortfolio.

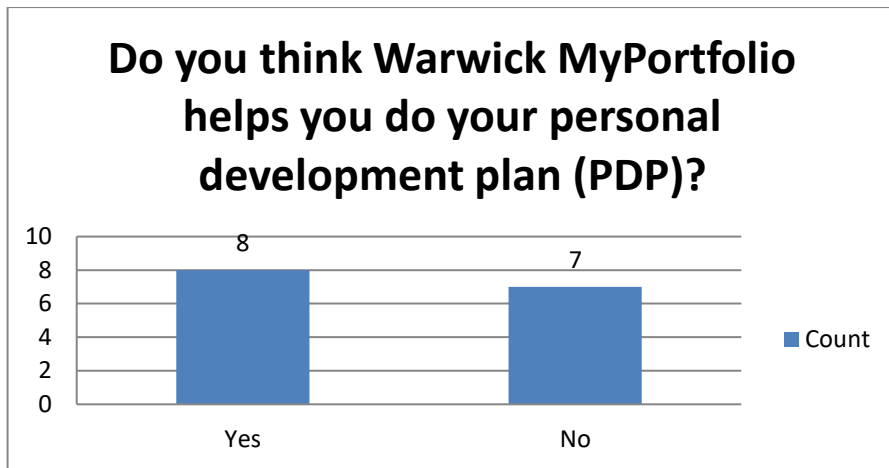


Figure 8.11: Do you think Warwick MyPortfolio helps you do your personal development plan (PDP)?

Among those who use Warwick MyPortfolio, only half of them think that it helps them to do their personal development plan while the other half did not think so (Figure 8.11).

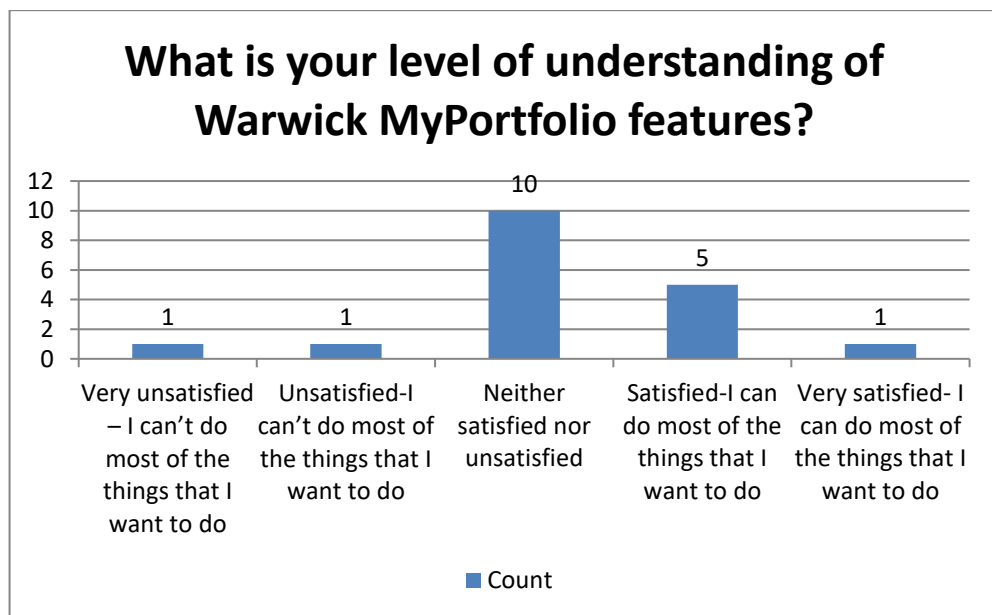


Figure 8.12: What is your level of understanding of Warwick MyPortfolio features?

In Figure 8.12, we can see most of the user of Warwick MyPortfolio neither satisfied nor unsatisfied with their level of understandings of the portfolio features which implies they do not care much about using it. Only a small number of students said

they were satisfied or very satisfied in using the e-portfolio system which suggests that they really use the e-portfolio to assist their learning.

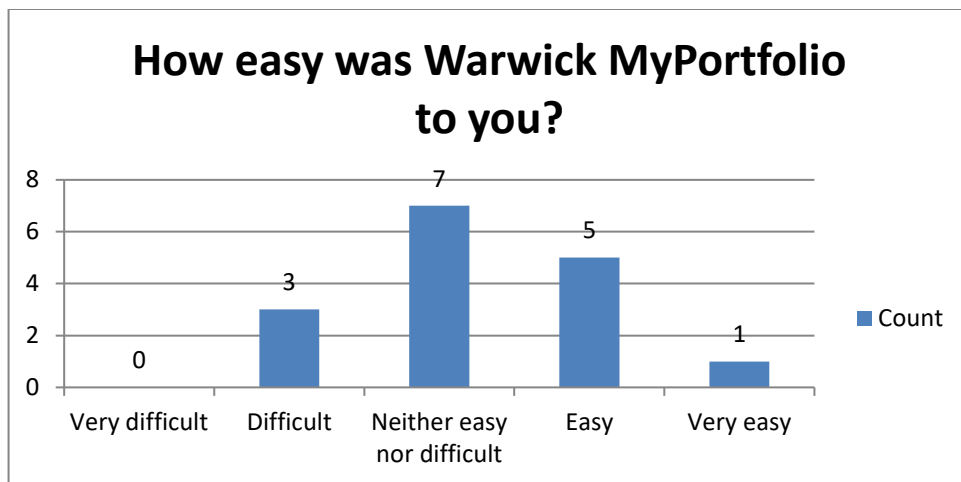


Figure 8.13: How easy was Warwick MyPortfolio to you?

In Figure 8.13, for most of the students who use Warwick MyPortfolio their perceptions of it were neither easy nor difficult. This also suggests that they did not use it much.

#### 8.3.1.4 Student perceptions of game elements in Warwick MyPortfolio (if applied)

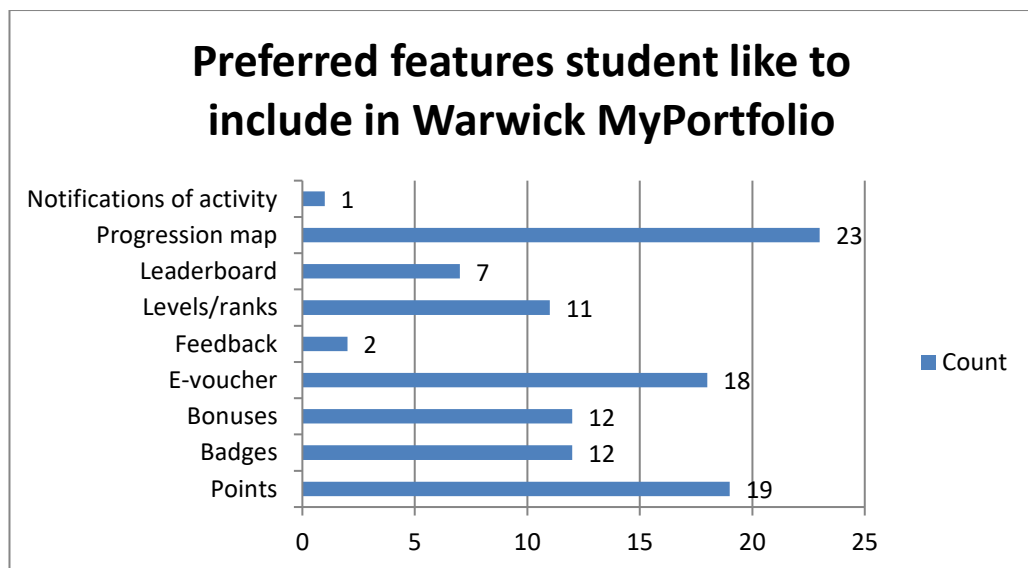


Figure 8.14: Preferred features student want to include in Warwick MyPortfolio.

Figure 8.14 shows an interesting result of the preferred features that students like to include in the e-portfolio. The top three preferred features are the progression map followed by points and e-voucher. Voucher is a monetary reward in the form of financial benefits for users that has been discussed with other reward categories such as status, achievement, learning, other self-development, and social community under the reward categories of gamification in chapter 2 (please refer to Table 2.3). The term e-voucher or e-coupons has many meanings in different domains. It has been referred to as e-voucher and e-currency in online marketing; as an e-card and printable certificate templates; and as an access token in system authentication (Chen-Wilson et al. 2009). In e-portfolio, e-voucher is referring to electronic voucher or coupon that can be redeemed by the user via several channels like for eating at café, buying items from the book shop or for printing services. E-voucher has been added as one of the reward categories of the gamified e-portfolio based on the KPM student's suggestion from the post-survey and interviews responses to improve the gamified e-portfolio. The result from Figure 8.14 implies the possibility of applying game elements in the e-portfolio which could improve user engagement and motivation.

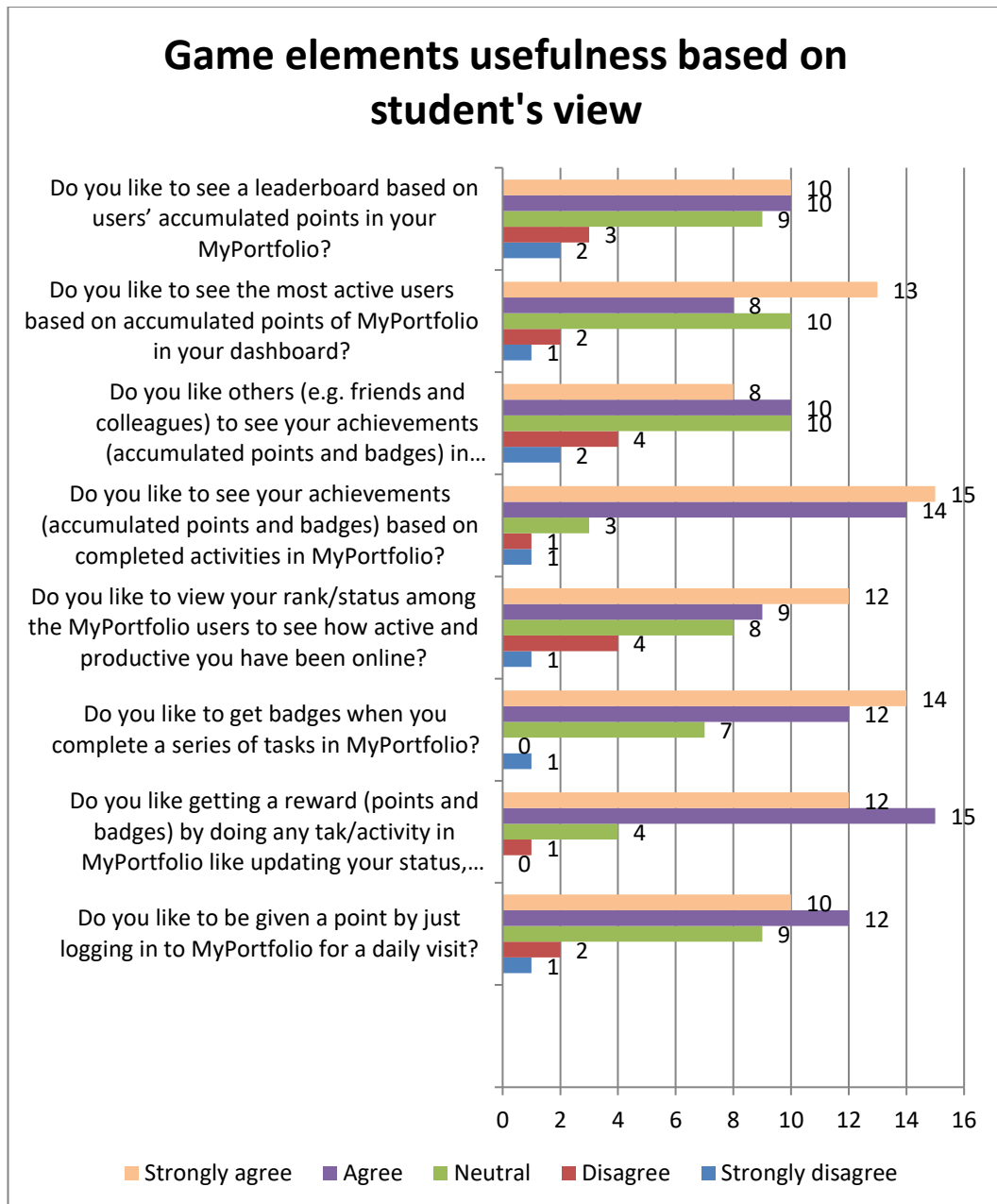


Figure 8.15: Rate how do you think of the game elements if included in Warwick MyPortfolio?

Figure 8.15 shows a total of 29 students like viewing their achievements (strongly agree and agree), 27 students like getting a reward (points or badges) by doing any task in MyPortfolio, and 26 students like the idea of getting badges if they completed a series of tasks in MyPortfolio. This suggest that getting a reward like points and badges (game elements) for completing a task is quite appealing to the students.



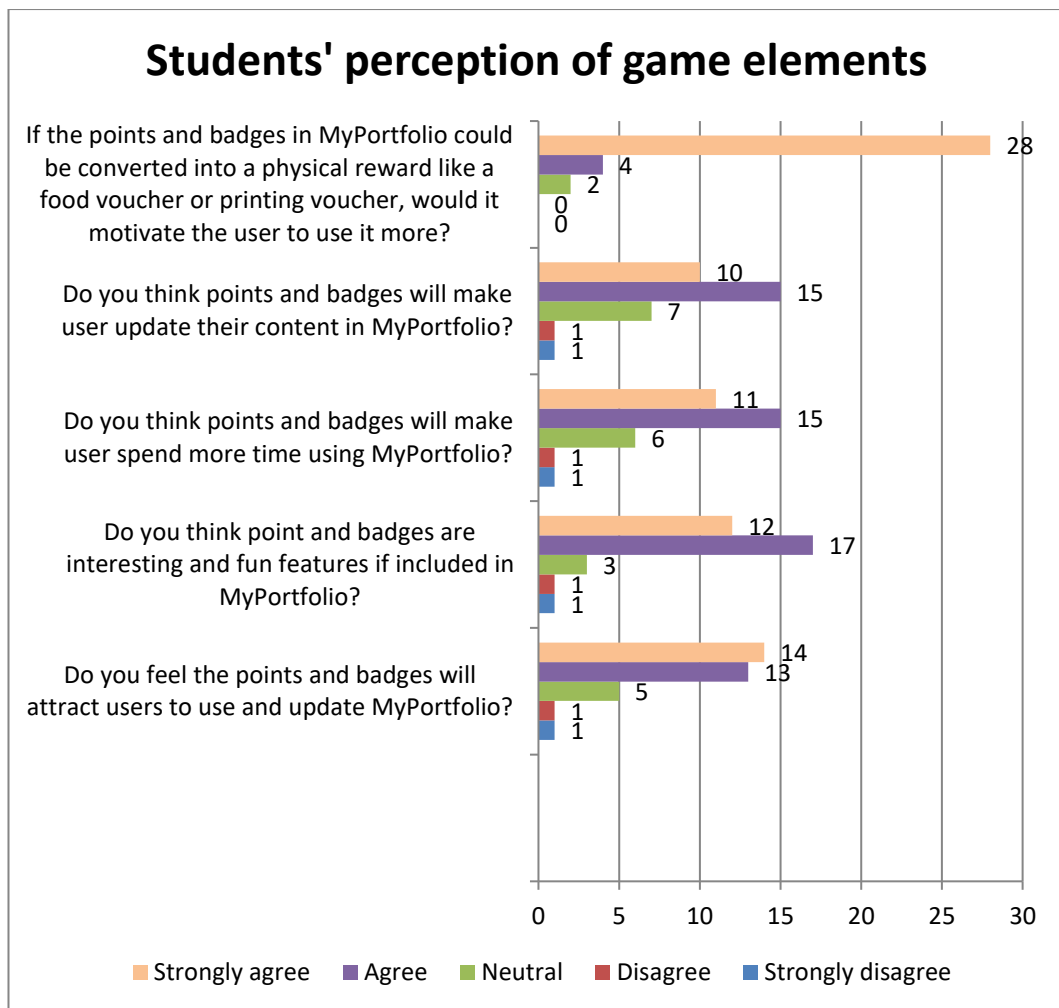


Figure 8.16: Student's perceptions of the game elements.

Figure 8.16 shows the possibility of points and badges to attract the users to use the e-portfolio. The most important thing to consider is they really like the idea of converting the virtual rewards into physical rewards and feels it really motivate the user to use it more.

#### 8.4 Discussion of the results

The mini survey was done at the University of Warwick to provide a slightly richer set of data which represent a sample of a higher education institution with e-portfolio application in place to compare the user point of view of the current e-portfolio system and user's perceptions of the gamified e-portfolio approach.

The findings of the survey show:

- A variant of students' background in terms of the department of study, courses that they are currently in, their level of degree, year of study, nationality, gender, and age. This contributes to broader perspectives of the gamified e-portfolio which is very different from the KPM students' perspectives that have the same background.
- The students have no problem to access the internet services both at home and at the university, with their internet connection reliability rated as acceptable, good, and very reliable while KPM students do face some problems in accessing the internet. This improves the chances of the gamified e-portfolio to be more successful if it would be implemented in such a good setting.
- Students access the internet daily and mostly satisfied with their internet skills.
- Most of the students have more than one device to access the internet, and they use mobile devices (laptop, smartphones, and tablet) more than a desktop computer which suggested that the e-portfolio system should be made available on various platforms. The MeP is available on various platforms.
- Most of the students are confident and very confident using their desktop or laptop which suggests they have good computer skills and frequently use them.
- The students who have an e-portfolio account usually update their portfolio using their laptop which suggests they consider the laptop as their working devices to assist learning.
- More than half of the respondents knew about MyPortfolio but did not take any initiative to attend any course/training offered by the university which means they still perceive it as a non-essential tool for learning.
- Less than half of the respondents were using MyPortfolio. The students who were using MyPortfolio has used it around six months or less, so they did not have enough experience in using it.

- The top three reasons for not using Warwick MyPortfolio include 'I don't have time to use it', 'It is not compulsory', and 'I don't need it'.
- The frequency of updating their portfolio varies from non-specified duration for the students who answered, 'others' to 'once a month' and 'weekly'. This suggests that they did not frequently update their portfolio.
- Half of the respondents think that MyPortfolio helps in their Personal Development Plan.
- However, most of the students rated their level of understanding of MyPortfolio is 'neither satisfied nor unsatisfied' and rated the MyPortfolio as 'neither easy nor uneasy' to use.
- The top three preferred features are the progression map followed by points and e-voucher (please refer Figure 8.14).
- Students like the idea of getting badges, viewing their achievements and seeing active users in the e-portfolio but prefer to keep their information privacy.
- The most important thing to consider is the students really like the idea of converting the virtual rewards into physical rewards and feels it really motivate the user to use it more but still feels the game elements appealing.

## **8.5 Conclusion**

By looking at the results and discussion, we can say that the game elements integration in the e-portfolio system can be a good approach for the University of Warwick to consider in their MyPortfolio. It is good to improve user engagement and motivation because the university already has a very good infrastructure and internet services with ample support in terms of training. The university can consider linking the virtual reward system in the gamified e-portfolio with a physical reward system available at Warwick like eating coupon at the Warwick Library Café or printing voucher through Warwick print to make it more interesting. Therefore, we can conclude that there is a good potential of the gamified e-portfolio if it is implemented in Warwick.

## **8.6 Chapter Summary**

I have discussed in detail about the objectives, methodology, design, and results of the Warwick survey. Later in the chapter, I have discussed on how the results from this survey can be used to generalise the effort of our research of gamified e-portfolio to increase user engagement and motivation to be replicated in different higher education institutions with different background and settings.

## Chapter 9

### Discussion, Contributions, Conclusion, the Recommendations and Future Work

This chapter will discuss how the outcome of the research support the research questions, the recommendations made based on the findings and the conclusion.

#### 9.1 Introduction

This study aimed at conducting research in order to explore the possibility of using gamification approach to improve user motivation and engagement in using the e-portfolio application in the Higher Education Institution in Malaysia.

In the first stage of the study, the preliminary investigation (chapter 4) was carried out to evaluate student readiness in terms of technology affordance and skills as well as the institution's current infrastructure and facilities to ensure the success of the implementation of the gamified e-portfolio.

In the second stage of the study (chapter 5), I presented the theoretical framework that supports our approach and proposed a gamified e-portfolio framework to assist in the next stage of the study.

In the third stage (chapter 6), I designed, developed, and implemented the gamified e-portfolio system to see the how the students react to the game elements of the e-portfolio system.

In the fourth stage (chapter 7), I gathered and analysed the student's perceptions data to be able to make conclusions.

In the fifth stage (chapter 8), I try to generalize the findings and get different student's background perceptions of the gamified approach to the e-portfolio. The following sections present the discussions of findings of this study.

## 9.2 Discussion of the results

Based on the results of the evaluation, this section will present and answer the research questions put forward by this thesis. Each question will be appropriately addressed here through the most important findings from the research.

### **Research question 0:**

***Can we improve user motivation and engagement in an e-portfolio system by applying game elements?***

To answer the main research question, I have broken it down into six related research questions.

### **Research question 1: Do the current infrastructure and facilities support the use of an e-portfolio system in the institution?**

The pre-survey and Warwick mini survey has been designed to answer research question 1. This is an attempt to get a wider generalisability of the outcomes based on an institution that is located in Malaysia and another institution located in UK. Based on the results from the pre-survey and Warwick mini survey, we can conclude that the Malaysian students have a quite good infrastructure, computer skills and Internet skills while Warwick students have better infrastructure, computer skills and Internet skills. It is based on the followings:

### **RQ 1.1 Do students have access to the Internet?**

#### *KPM students (Malaysia)*

Most of the students (73% male students and 79% female students) have an acceptable to excellent Internet connection whether it is at home or college (please refer Figure 4.6 in chapter 4). 49.39% usually access the Internet at home, 44.85% at the college, 4.85% access from public terminal and 0.91% access at cyber café (refer Figure 4.2, chapter 4).

#### *Warwick students (UK)*

Most of Warwick respondents have access to the Internet at home (97.1%), at the university (100%), and none of them have problem accessing the Internet (refer Figure 8.1).

Warwick students have a better Internet accessibility compared to KPM students.

### **RQ 1.2 Do students have suitable devices to connect to the Internet?**

#### *KPM students (Malaysia)*

The top three used devices by the KPM students to access the Internet were smartphones (35.4%) followed by laptops (34.2%) and desktop computers (22.4%). This shows that the students have suitable devices to connect to the Internet and their preferences to use mobile devices compared to the fixed terminals such as desktop (refer Figure 4.4 in chapter 4).

#### *Warwick students (UK)*

From 34 respondents from Warwick, most of them have laptop (34), nearly all have smartphones (32), 20 respondents have tablet, and 15 students have desktop.

Students from both institutions have suitable devices to connect to the Internet.

### **RQ 1.3 Do students have acceptable Internet skills?**

#### *KPM students (Malaysia)*

Most of the students have been using the Internet for five years or more which suggests that they have quite an experience using the Internet. 31.04% of the students said that were very satisfied, 51.72% were satisfied, 13.22% were neither satisfied nor unsatisfied, 3.45% were unsatisfied, and only 0.57% were very unsatisfied (with their Internet skills that show these students do have acceptable to good Internet skills (refer Table 4.1 in chapter 4).

#### *Warwick students (UK)*

35% of the students are very satisfied with their Internet skills, 53% are satisfied, 3% of them are neither satisfied nor unsatisfied, and 9% of them are very unsatisfied.

There are no big differences in the figures on the self-evaluation of the students' internet skills for both institutions (Malaysia and UK).

### **RQ 1.4 Do students have acceptable computer skills?**

#### *KPM students (Malaysia)*

Most of the KPM students feel comfortable (to very comfortable) using a computer (refer Figure 4.3 in chapter 4).

#### *Warwick students (UK)*

56% of the students are very confident using a laptop or desktop, 41% are confident, and only 3% neither confident nor unconfident.

Malaysian students are comfortable (to very comfortable) using a computer while more than half of the UK students are very confident using a computer.



### **RQ 1.5 Are the Internet services used by the students satisfactory?**

#### *KPM students (Malaysia)*

Even though there was a variance of the students' Internet speed, most of the students rated their Internet connection speed as acceptable, which indicates the Internet service provided by the college and their Internet service at home was acceptable (Figure 4.5 in chapter 4). Furthermore, 74.71% of the students agree that their current Internet service does not restrict the way they use the Internet and more than half of the students (62%) agree that their Internet connection speed ranges from acceptable to excellent level (refer Table 4.4 in chapter 4). This clearly shows that the Internet services used by the KPM students deemed satisfactory.

#### *Warwick students (UK)*

Warwick students rated their Internet connection as acceptable (31%), good (35%), and very reliable (32%).

We can see, Warwick students have acceptable to good Internet connection while KPM students have acceptable Internet connection.

### **RQ 1.6 How frequently do the students use the Internet?**

#### *KPM students (Malaysia)*

Most of the students have been using the Internet for five years or more and used it daily. The frequency of the Internet usage suggests that they need it in their daily activities.

#### *Warwick students (UK)*

All Warwick respondents use the Internet daily.

We can imply that the Internet is a necessity for students from both institutions.

## **Research question 2: What is suitable game mechanics for an e-portfolio system?**

Based on the literature search and the results from the pre-survey, I have identified the suitable game mechanics for our e-portfolio system. Most of the KPM students also suggested to include e-voucher from the interview sessions. Other than that, I also asked the similar question to Warwick students to see their preferences.

### **RQ 2.1 What type of game elements do students prefer?**

#### **KPM students (Malaysia)**

The top three game elements voted by the students during the preliminary survey were points (97.7%) followed by feedback (62.64%) and status (59.2%). The selection of the suitable game elements also come from the literature survey that suggested competitive elements such as leaderboards, points, and badges, would make the e-learning experience have a positive effect to the users. Thus, I decided to include the points, badges, leaderboard, feedback and status in the gamified e-portfolio system, MeP.

#### **Warwick students (UK)**

The top three game elements preferred by Warwick students are progression map (to show status), points), and e-voucher. E-voucher has been included in the selection based on the suggestion from most of the KPM students for the gamified e-portfolio improvement in the interviews. Other game elements that follows are badges, bonuses, and ranks (refer section 8.3.1.).

Students from both institutions preferred points, status, and e-voucher followed by badges to be included in the gamified e-portfolio.

**Research question 3: How usable and useful will students find the game elements in the e-portfolio system?**

To answer this question, I divided into several sub-research questions that have been answered through the post-survey and the interviews findings. These findings confirmed that most of the students do find the game elements in the e-portfolio system usable and useful.

**RQ 3.1 Do points, badges, and leaderboards make users want to update their e-portfolio content?**

In general, 53% of the participants agreed that the game elements in the MeP system make them want to compete with their friends to update their e-portfolio (refer to section 7.3.4, student feedback on the advantages of the e-portfolio with 'gamified' elements).

**RQ 3.2 Do points, badges, and leaderboards improve user visits to the e-portfolio system?**

To answer this sub research question, I refer to section 7.3.4, item number 4 'encourage me to visit the e-portfolio more often' that shows 55% of the participants agreed that the gamified e-portfolio encourage them to visit the e-portfolio more often (47% agree, 8% strongly agree). This indicates the game elements in the e-portfolio do have some impact on the users.

**RQ 3.3 Do points, badges, and leaderboards increase the frequency of users updating their e-portfolio?**

The game elements do increase the frequency of users updating their e-portfolio. This can be seen in the results answered by the participants for item 'reward points accumulated will encourage me to update the e-portfolio' in section 7.3.4. that shows 41% of the participants agree and 24% of the participants strongly agree with it.

**RQ 3.4 Do points, badges, and leaderboards encourage users to share more artefacts in their e-portfolio?**

The game elements did encourage the users to share more artefacts in their e-portfolio based on their responses for item 'encourage me to upload and share learning evidence in the e-portfolio more often' that shows 47% of the participants agree and 12% strongly agree to it.

**RQ 3.5 Do points, badges, and leaderboards encourage users to give more feedback on others' artefacts in an e-portfolio system?**

To answer this, I refer to item 'encourage me to give comments to friend's artifact in the e-portfolio'. 39% of the participants agree, and 12% strongly agree with it. Therefore, we can say that more than half of the students agreed that the game

elements encourage them to give more feedback on others' artefacts in an e-portfolio system.

**Research question 4: How can the implemented game mechanics (points, badges, leaderboard) increase user intrinsic values?**

To answer this research question, I have listed a list of sub-research questions to be answered to make a conclusion on how the game mechanics increase user intrinsic values. I based our research by using the gamification approach using selected game elements that can extrinsically attract the users and later, using the user's motivation that develop the user's feeling of relatedness, autonomy, mastery, and purpose (RAMP) to assist behavioural change.

**RQ 4.1 Do points, badges, and leaderboards make users feel a sense of satisfaction?**

Yes, all students who participated in the interviews agreed that the game elements make them feel a sense of satisfaction as it shows that they are doing something in the system and get rewarded for it.

**RQ 4.2 Do points, badges, and leaderboards make users feel a sense of achievement?**

Yes, all students who participated feel that the game elements make them feel a sense of achievement especially when they receive a point or a badge for completing a task or a series of tasks. Furthermore, when they see their name on the leaderboard as the top scorer, they feel a sense of pride.

**RQ 4.3 Does getting a reward (points, badges) after completing a task/activity motivate a user to update their e-portfolio content?**

Yes, all users agreed that by getting a reward after completing a task/activity motivate them to update their e-portfolio content and to participate in it. The leaderboard makes them want to compete.

**RQ 4.4 Does getting a reward (points/badges) after completing a task/activity encourage a user to participate/ interact more with an e-portfolio system?**

Yes, when they look at their friend's achievement, they feel the need to participate more to be able to get the more points and badges that their friends have already collected.

**Research question 5: Do the social elements (blog, group, and forum) encourage users to connect and collaborate?**

I use the findings from the interviews to answer this question. Most of the students use group and forum discussion to discuss about their assessment. Nearly all respondents agreed that the MeP help them to add more friends, assisting in collaboration for they can simply communicate without having to meet face-to-face and it could be done anytime and anywhere if they have Internet connection and the system is available. Furthermore, they can share more materials during discussion by providing links and other materials and get fast feedback from their friends. The respondents find that the social elements are useful and helpful to connect and collaborate and could make them engage with the system.

**Research question 6: Do users feel that they have control of their portfolio?**

The responses from the interview sessions confirmed that the users feel in control of their own portfolio due to they create it themselves, manage it by adding or removing materials that they think suitable, choose which materials that they want to share and discuss and add connection for a better networking opportunity. They feel that they are the owner of the e-portfolio as they are responsible to participate with the content of the MeP so they can collect points, badges and improve their ranking in the leaderboard. They can compare their achievement with their friends' achievement, and this make them want to compete among themselves.

### 9.3 Research Challenges and Limitations

I faced several challenges along the way to complete the study. They are:

- I faced a technical glitch during the development and the implementation phase of the gamified e-portfolio system in terms of limited skills of the researcher and limited resources. In the beginning, I took a student package from Exabytes Malaysia for the web hosting services. However, due to the heavy traffic of the MeP users who were participating in the MeP system, I had to move our web hosting services to a GoGeek plan from SiteGround UK to support the demands of users. There was also a downtime of the website due to the migration of the system from one company to another which was not good to the users as they cannot access the system temporarily. This may affect their perceptions of the MeP system.
- I also faced a 'Brute Force' attack on the website's administrator's password that contributed to the traffic. I worked closely with the SiteGround technical assistant on how to overcome this problem, and this takes some time for our development and implementation phase of the system.
- To get as many participants to participate voluntarily in the study was very challenging. Therefore, I only manage to get participants from only one college to participate in the study and participants from the University of Warwick to support the study generalisation.

Limitations of the research:

- The researcher's technical skills and knowledge are limited which means more time needed for the researcher to design and develop the gamified e-portfolio system as a single developer.
- The research was also conducted at one of the Kolej Profesional MARA (KPM) in Malaysia whereas including other KPM in Malaysia might provide a better representation of the KPM students. Furthermore, only students from one course at KPMIM participated in this study. It is better if the participants



of the study comprised of students of different courses and stages of their studies.

- Participation in the study was voluntary and data collected at a single point in time may not sufficiently represent the perspectives of the entire student population in KPM HEI and University of Warwick.
- The mini survey with Warwick students was based on the existing e-portfolio application that they have in place (Warwick MyPortfolio) and not the gamified e-portfolio. The findings might be limited due to the lack of experience of the participants in using a gamified e-portfolio.

#### **9.4 Research Contributions**

This research was an attempt to contribute to the empirical research of the gamification of e-learning in general and to the gamification of e-portfolio specifically. The contributions of the study are described as follows:

##### **9.4.1 The research community**

The completion of the research enabled me to contribute to these areas:

- i. Gamified e-portfolio framework – the production of the gamified e-portfolio framework to the research community that includes the engagement principles, motivation types, and ownership and control as inputs to the gamified e-portfolio system design elements (refer Figure 5.11 in chapter 5). Even though more work needs to be done to test this approach, it will give a significant contribution to the research community to continue the work in different settings and groups to make the e-portfolio stay relevant to the students and higher education institutions around the globe.
- ii. Helped in solving the user engagement issues in the e-portfolio system by making it fun and engaging.

- iii. Identified the perceptions of students towards the gamification approach to e-learning to explore the possibility of the implementation and to be able to generalise the findings to a wider context of implementation.

#### **9.4.2 The lecturers**

Lecturers of institutes with the specified features can benefit greatly from this study to apply the new tool in their teaching and learning activities. This will assist in the institution-wide knowledge sharing among students and lecturers by using the gamified e-portfolio system. Other than that, it will help the lecturers to solve many problems such as the constraints to schedule a face-to-face meeting with the students, organised a group discussion, a platform to share learning resources and create learning activities and the problem of monotonous lecturing style through various learning materials and resources.

#### **9.4.3 The students**

This study will be beneficial to the students in terms of providing a more fun and engaging way of learning. The students will be more interested in using the e-portfolio system and receive the advantages of independent learning style. Other than that, it will increase students' communication, collaborations, knowledge and skills. This gamified e-portfolio system can also contribute to the more flexible way of sharing learning materials in various forms and formats.

#### **9.4.4 The higher education institutions and universities**

The outcome of this study should help to improve teaching and learning activities in any similar HEI. By using the gamified e-portfolio, it can promote institution-wide knowledge sharing by using a single platform that is fun and interesting.

Universities in general can gain important information regarding the usage of the gamified portfolio. From this information, they can plan more strategies to promote the use of their e-portfolio. The study can also give them ideas for a change in their e-portfolio system to solve the user's engagement issues through gamification.

#### **9.5 Research Conclusion**

This research will explore the results of gamified e-portfolio towards users' engagement and motivation in KPM.

#### **9.6 Research Recommendation and Future Work**

I would like to recommend that this gamified e-portfolio framework to other higher education institutions that face the user engagement issues to explore the outcomes of the implementation. For future work, more focus needs to be done in the participation of the lecturers in the gamified e-portfolio system as the students pointed out that the main attraction of such e-learning system is the teacher/lecturer as a provider of the knowledge and their feedback is very valuable to the students. There are also interesting results that need further exploration from Table 4.11 in chapter 4 about the students do not understand the differences between games and gamification. This could be an interesting topic to be discussed and explore. Other than that, it would be more interesting if I can extend the gamified e-portfolio system to a context-aware application. Context is any information that can be used to characterize the situation of an entity. An entity is a

person, place, or object that is considered relevant to the interaction between a user and an application, including location, time, activities, and the preferences of each entity (Dey and Abowd, 1999). According to Shin et al. (2009), traditional approaches do not consider the changes of user preferences according to context and as a result, these approaches consider the user's overall preferences, although the user preferences on items varies according to his/her context. Yahya et al. (2010) in their study stated that context-awareness is establishing an environment that can adapt to the learner's real situation to provide adequate information for the learners along with another four proposed characteristics of u-learning (ubiquitous learning) which are permanency, accessibility, immediacy and interactivity. In the case of the gamified e-portfolio implementation, most e-portfolio system do not consider the context of the e-portfolio users. I believe, context-awareness is another interesting solution to engage users in the e-portfolio system to be explored by other researchers. Therefore, I would like to recommend the gamified e-portfolio to be extended to include the user context for future research.

## **9.7 Chapter Summary**

The aim of this research is to explore the effect of a gamified e-portfolio system towards users' engagement and motivation. The findings of this research have enabled me to successfully achieve this aim. The study was able to empirically demonstrate and partly validate the gamified e-portfolio framework.

The overall finding of this study is that gamified e-portfolio improves user engagement and motivation and makes it fun and interesting. These encouraging and positive results based on students' perceptions of the gamified e-portfolio will open many doors to the exploration of the approach in various settings, groups, location and environment.

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## Appendix A – Pre-survey



### Department of Computer Science

#### Questionnaire

Dear student,

My name is Monisa Abdul Wahab. I am a postgraduate student at University of Warwick, United Kingdom. I am doing a research on user engagement issues in e-portfolio application. The purpose of this questionnaire is to investigate students' perception of e-portfolio and factors that increase user (student) engagement towards e-portfolio application.

You have been identified as an individual who would meet the criteria for my research. I would be grateful if you would agree to participate in my study. Your participation is voluntary and your responses will remain strictly confidential.

The survey is located online at the Department of Computer Science, University of Warwick's website at <http://www2.warwick.ac.uk/fac/sci/dcs/research/edtech/surveys/monisa>. The collected data will be analysed by me. The survey will take approximately 20 minutes to complete. Please be aware that the Department's ethical rules and procedures have been followed, and ethical consent has been granted for this questionnaire from the Department and from MARA Higher Education Division (*Bahagian Pendidikan Tinggi MARA*) and from the Research Ethics & Governance Office (REGO), Warwick Medical School, University of Warwick **REGO-2014-916 dated 15 July 2014**.

Item in this questionnaire has been developed to address the following elements: demographics, prior experiences with technology, e-portfolio creation and development, prior experiences in games application and perception, gamified features in e-portfolio, learning experiences, and future use.

Please let me know if you have any questions regarding this study. Feel free to contact me at M.Abdul-Wahab@warick.ac.uk.

Thank you very much for your time and cooperation.

Monisa Abdul Wahab

**A. Demographics**

*(Please note you information will **not** be sold or given to outside entities. It is for research use only)*

Name:

\_\_\_\_\_

Student ID Number: \_\_\_\_\_

Age *(Please specify)*: \_\_\_\_\_

College *(Please V one)*:

MARA Professional College Beranang	
MARA Professional College Indera Mahkota	
MARA Professional College Bandar Melaka	

Program *(Please V one)*:

HND in Computing (Software Development) – HND SD	
Diploma in Computer Networking – DCN	
Diploma in Creative Digital Media Production – DCD	
Diploma in Entrepreneurship – DEn	

Semester *(Please circle one)*:

1 / 2/ 3/ 4/ 5/ 6/ 7

Gender *(Please V one)*:

Female	
Male	

1. How long have you been using the Internet (including using email, social networking sites, blog, ftp, etc.)? *Please v ONE only.*

Less than 6 months	
6 to less than 12 months	
1 to less than 3 years	
4 to less than 5 years	
5 years and more	

2. How often do you use the Internet? *(Please v one)*

Daily	
Weekly	
Monthly	
Occasionally	
Never	

3. What devices do you use to access the Internet?

*(Please tick (v) all that apply)*

Desktop computer	
Laptop	
Tablet	
Smart phone/Mobile phone	
Other (please specify: _____)	

4. How frequently do you access the web from home, college or from public terminal (e.g. library, cybercafé, etc.)? *(Please v one)*

Daily	
Weekly	
Monthly	
Less than once a month	
Never	

5. Where do you usually access the internet? *(Select all that apply)*

Home	
College	
Others	

6. How reliable do you find your internet connection? *(Please v one)*

Very reliable	
Speed varies from time to time, but the connection never drops	
Speed varies from time to time, and the connection also drops from time	

to time	
Speed varies considerably and the connection regularly drops	
Very poor connection, which drops out all the time	

7. How would you rate the speed of your current internet connection? *(Please v one)*

Very slow	
Slow	
Acceptable	
Good	
Excellent	

8. Who pays for your Internet access?

*(Please v ALL that applies)*

Self	
Parents	
Employer	
School	
Other (please specify: _____)	

9. Generally, how comfortable do you feel using computers, in general? *(Please v one)*

Very comfortable	
Somewhat comfortable	
Neither comfortable nor uncomfortable	
Somewhat uncomfortable	
Very uncomfortable	

10. How satisfied are you with your current skills for using the Internet? *(Please v one)*

Very satisfied – I can do everything that I want to do	
Somewhat satisfied – I can do most things I want to do	
Neither satisfied nor unsatisfied	
Somewhat unsatisfied – I can't do many things I would like to do	
Very unsatisfied – I can't do most things I would like to do	

11. Does your current internet service restrict the way in which you use the internet?  
*(Please v one)*

No, it does not restrict the way I use the internet	
Yes, it restricts my ability to use some internet applications and services	
Yes, it restricts my ability to use the internet for basic functions	

**B. Student's current style in archiving and organising their learning materials**

No.	Questions	✓ Yes	✗ No
1.	Do you keep your learning materials or artifacts? <i>*Artifact is any assessment evidence such as report, assignment, essay, etc.</i>		
2.	Do you keep your learning materials or artifacts in a file?		
3.	Have your learning materials or artifacts gone missing or damage?		
4.	Do you ever share your learning materials or artifacts with others?		
5.	Would you like to share your work or stuff with others?		
6.	Do you like your friends to share their work with you?		
7.	Do you sometimes refer to any of your previous work to complete new task?		
8.	Do you keep any related materials along with your completed work for future use?		
9.	Do you like to receive feedback for your work?		
10.	Do you like to receive feedback of your completed work from your peers?		
11.	Do you like to receive feedback of your completed work from your lecturers?		
12.	Do you like to receive feedback of your completed work from other than peers and lecturers?		

12. If your answer for Q12 is 'Yes', then from who do you like to receive feedback on your completed work? (*Please ✓ one*)

Peers	
Lecturers	
Peers and lecturers	
Others	

**C. Prior experiences with e-portfolio creation and development**

No.	Questions	✓ Yes	✗ No
1.	I have already heard of the "e-portfolio" concept		
2.	I already know what "e-portfolio" means		
3.	I already know what should be in an e-portfolio		
4.	I have already had a paper-based portfolio of my learning experiences		
5.	In your opinion, which of the following items should be included in the e-portfolio?		
	• Profile Page		

	<ul style="list-style-type: none"> <li>Professional Resume</li> </ul>		
	<ul style="list-style-type: none"> <li>Personal Autobiography</li> </ul>		
	<ul style="list-style-type: none"> <li>Curriculum/coursework record</li> </ul>		
	<ul style="list-style-type: none"> <li>Extra-curricular activities</li> </ul>		
	<ul style="list-style-type: none"> <li>Second language skills</li> </ul>		
	<ul style="list-style-type: none"> <li>Work experiences</li> </ul>		
	<ul style="list-style-type: none"> <li>Contest record</li> </ul>		
	<ul style="list-style-type: none"> <li>Awards and prizes</li> </ul>		
	<ul style="list-style-type: none"> <li>Recommendations by lecturers or employers</li> </ul>		
	<ul style="list-style-type: none"> <li>Other skills</li> </ul>		
	<ul style="list-style-type: none"> <li>Links to other system such as MyLMS (kpmim), etc.</li> </ul>		
	<ul style="list-style-type: none"> <li>Links to personal blog</li> </ul>		
	<ul style="list-style-type: none"> <li>Links to social networking sites such as Facebook</li> </ul>		
	<ul style="list-style-type: none"> <li>Multimedia materials (e.g. audio or video clips related to your learning activities)</li> </ul>		
	<ul style="list-style-type: none"> <li>Notification of your inactivity duration</li> </ul>		
	<ul style="list-style-type: none"> <li>Notification of your last update of the e-portfolio content</li> </ul>		

**D. Prior experiences in technology, games application, gamification and perception towards game elements**

No.	Questions	√ Yes	X No
1.	Do you agree Internet plays a vital role in teaching and learning process?		
2.	Do you agree computer plays important role in completing an assignment?		
3.	I like to play computer games		
4.	I spend more than 1 hour daily playing computer games		
5.	I have already heard of the “gamification” concept		
6.	I think that games is the same as gamification		
7.	I have already heard of gamification in education		
8.	I know what game elements and game dynamics are		
9.	In your opinion, which of the following game elements should be included in the e-portfolio?		
	<ul style="list-style-type: none"> <li>Points</li> </ul>		
	<ul style="list-style-type: none"> <li>Badges</li> </ul>		
	<ul style="list-style-type: none"> <li>Bonuses</li> </ul>		
	<ul style="list-style-type: none"> <li>Feedback</li> </ul>		
	<ul style="list-style-type: none"> <li>Notification of your current status ranking</li> </ul>		
	<ul style="list-style-type: none"> <li>Notification of your inactivity duration</li> </ul>		
	<ul style="list-style-type: none"> <li>Leader board</li> </ul>		
	<ul style="list-style-type: none"> <li>Levels</li> </ul>		
	<ul style="list-style-type: none"> <li>Status/rank</li> </ul>		
	<ul style="list-style-type: none"> <li>Progression map</li> </ul>		



## Appendix B – MeP User Interfaces

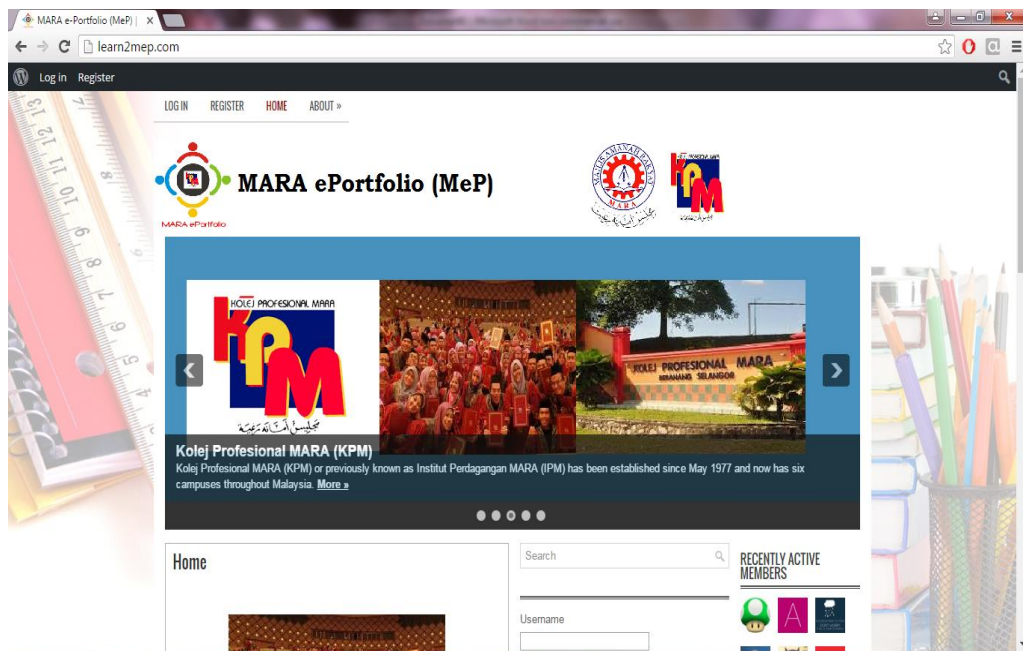


Figure B.0.1: Home page top

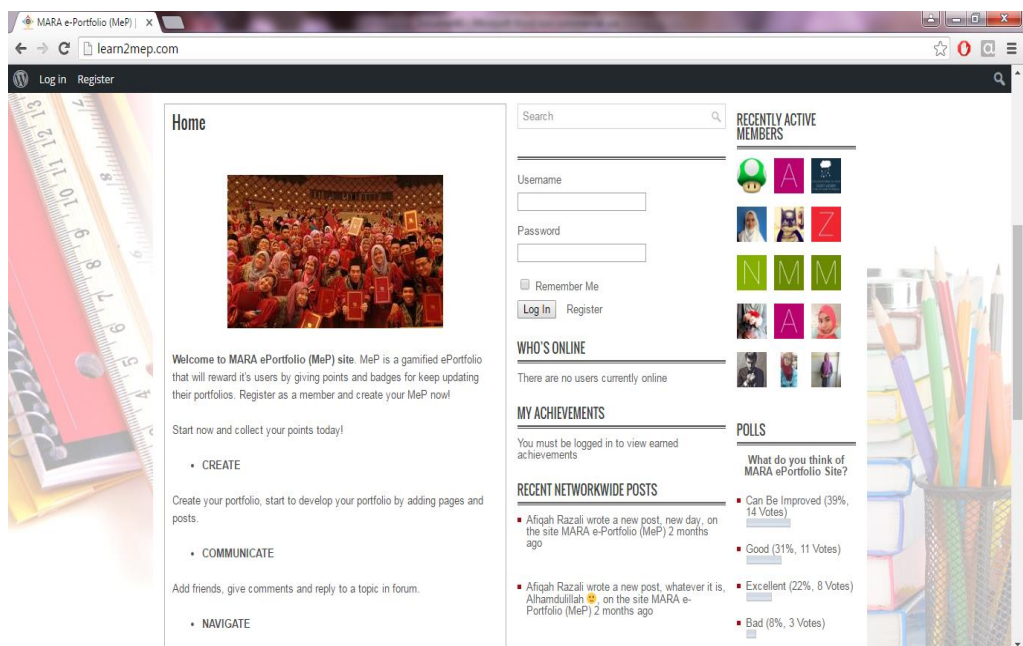


Figure B.0.2: Home page middle

Figure B.0.3: Menu before login



Figure B.0.4: Menu after login

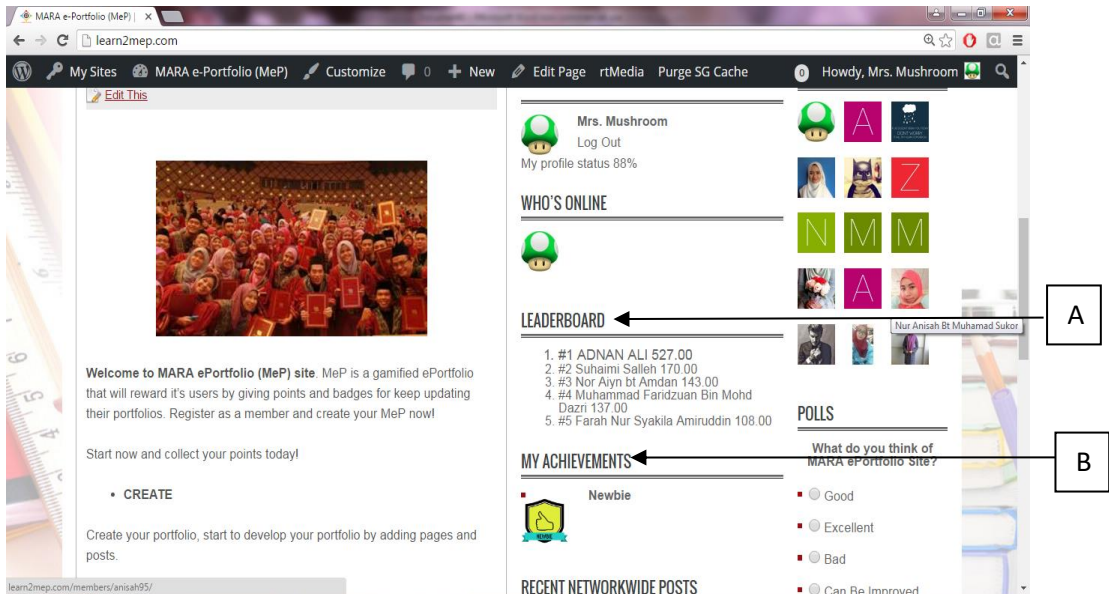


Figure B.0.5: Home page for member with leaderboard (B) and achievements (A)

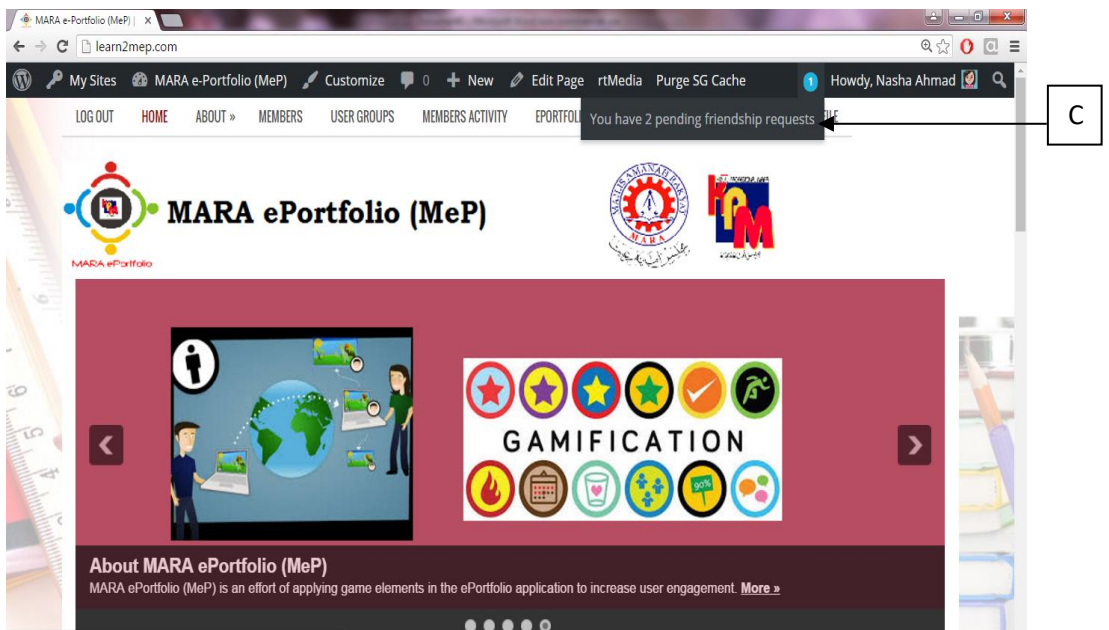


Figure B.0.6: Notification features (C)

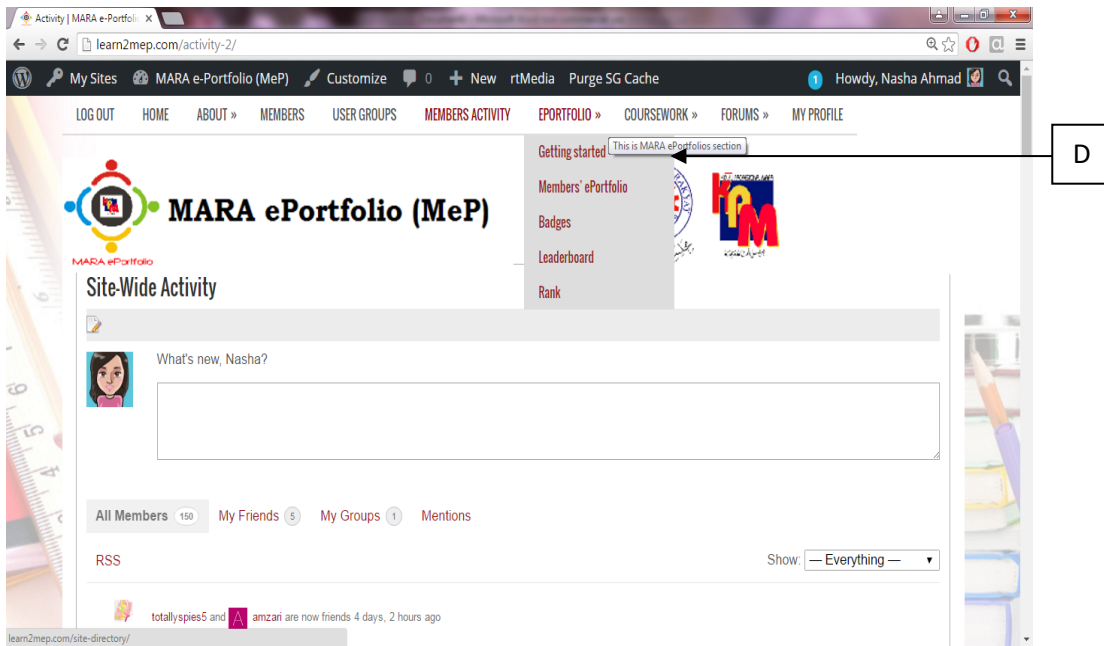


Figure B.0.7: Sample of submenu

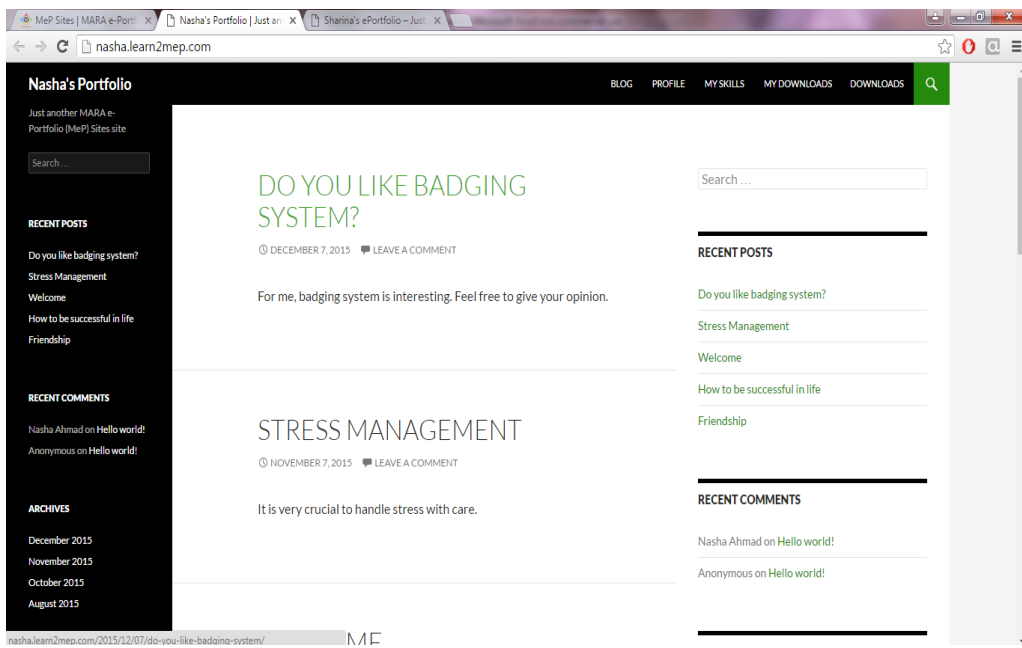


Figure B.0.8: Sample personal portfolio

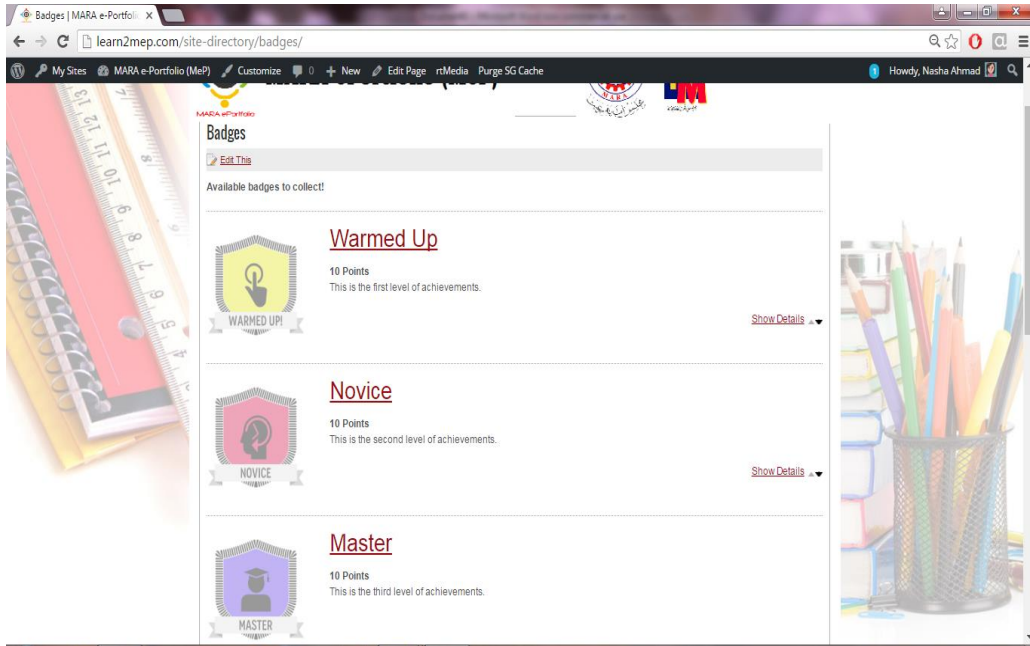


Figure B.0.9: Sample of available badges to collect

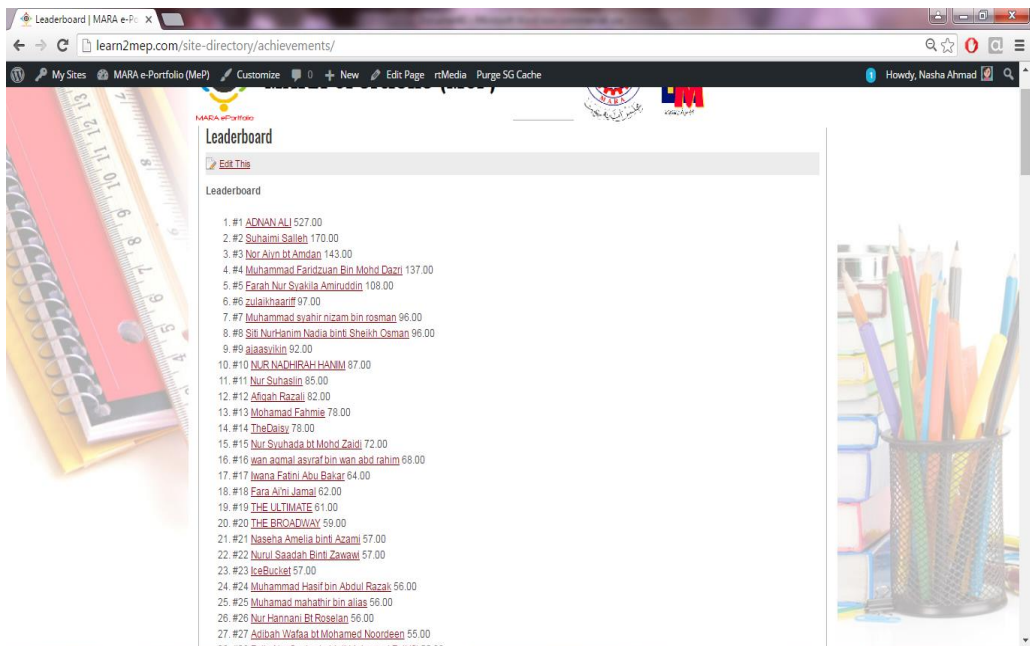


Figure B.0.10: Leaderboard page

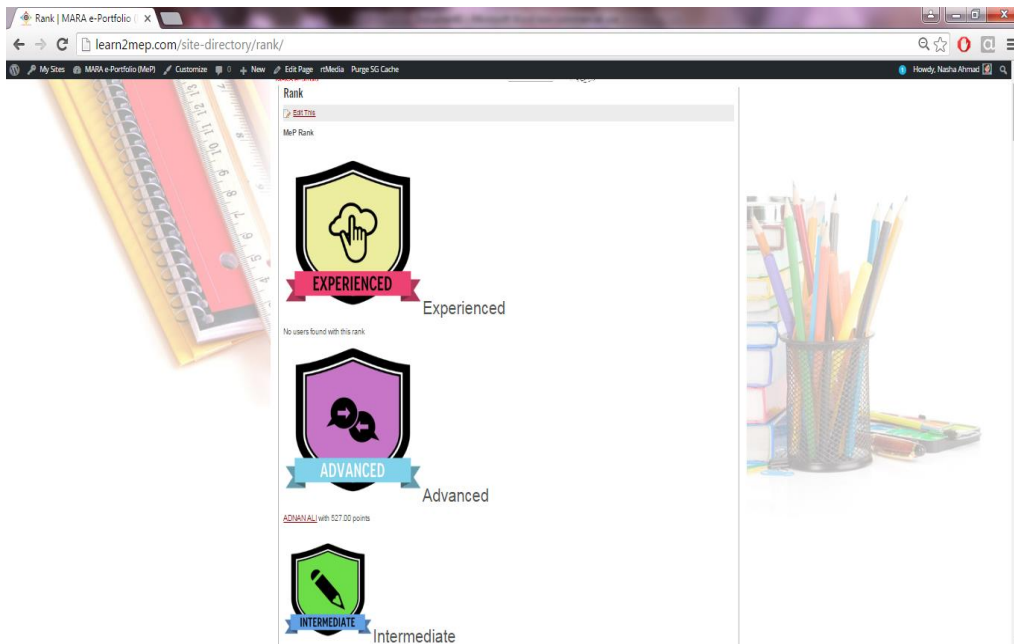


Figure B.0.11: Rank page

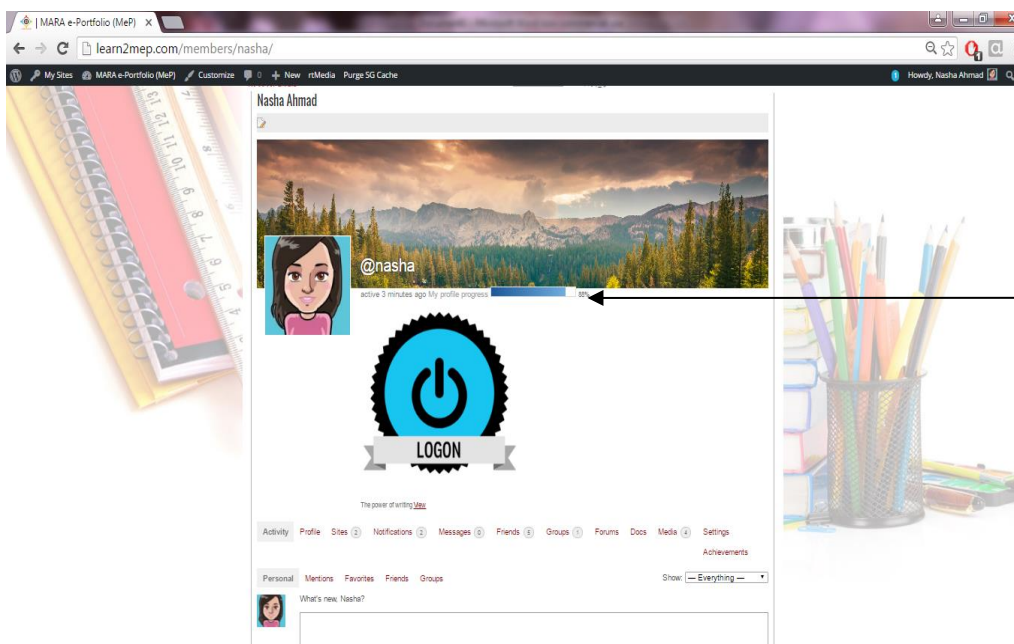


Figure B.0.12: Profile page with user profile progression bar (E)

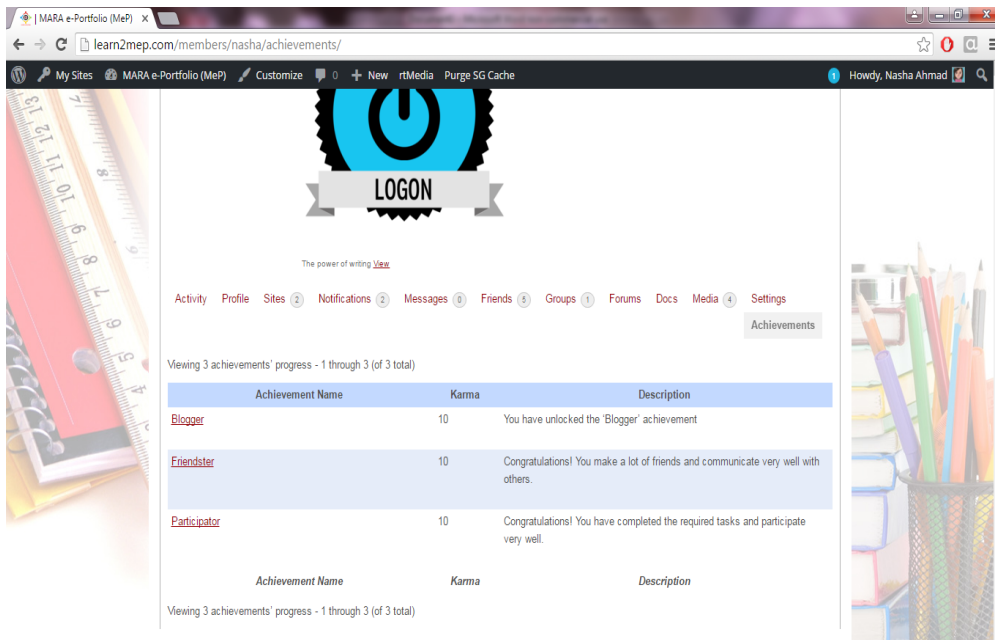


Figure B.0.13: Sample user achievement in user profile page

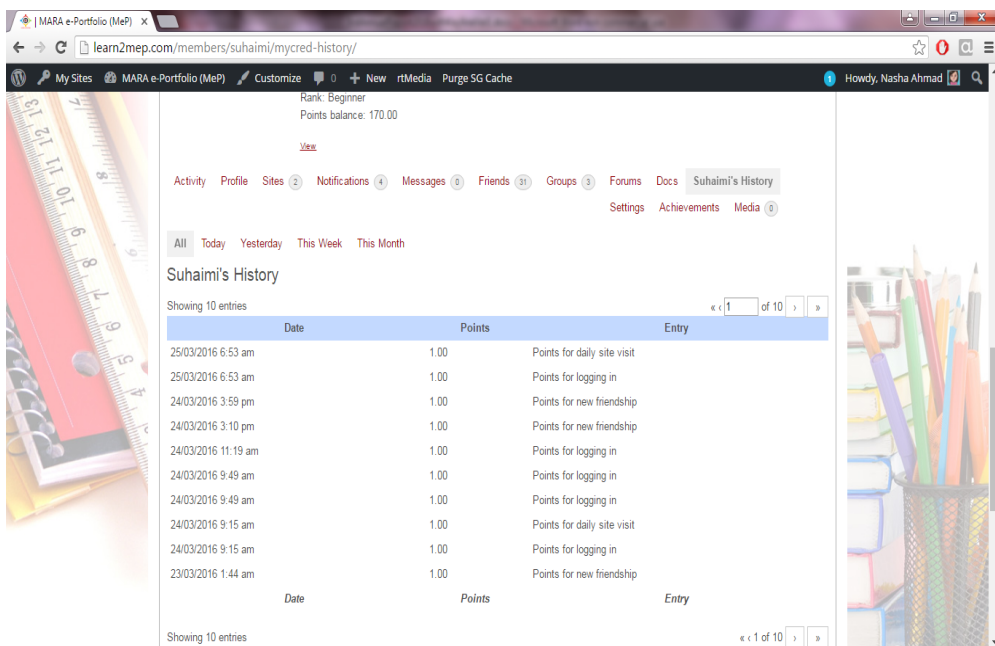


Figure B.0.14: Sample user history in profile page

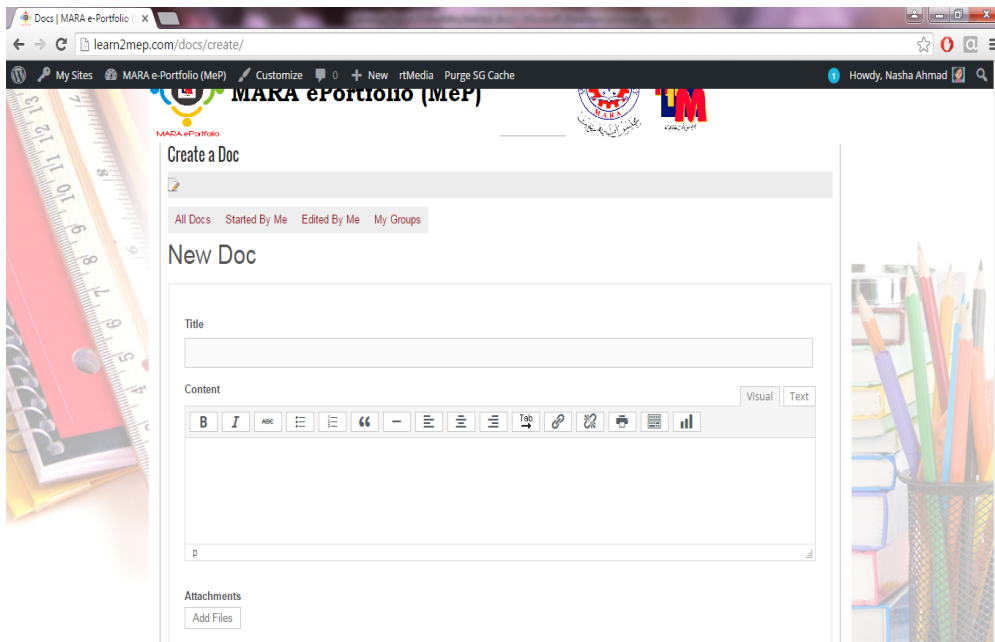


Figure B.0.15: Document creation page

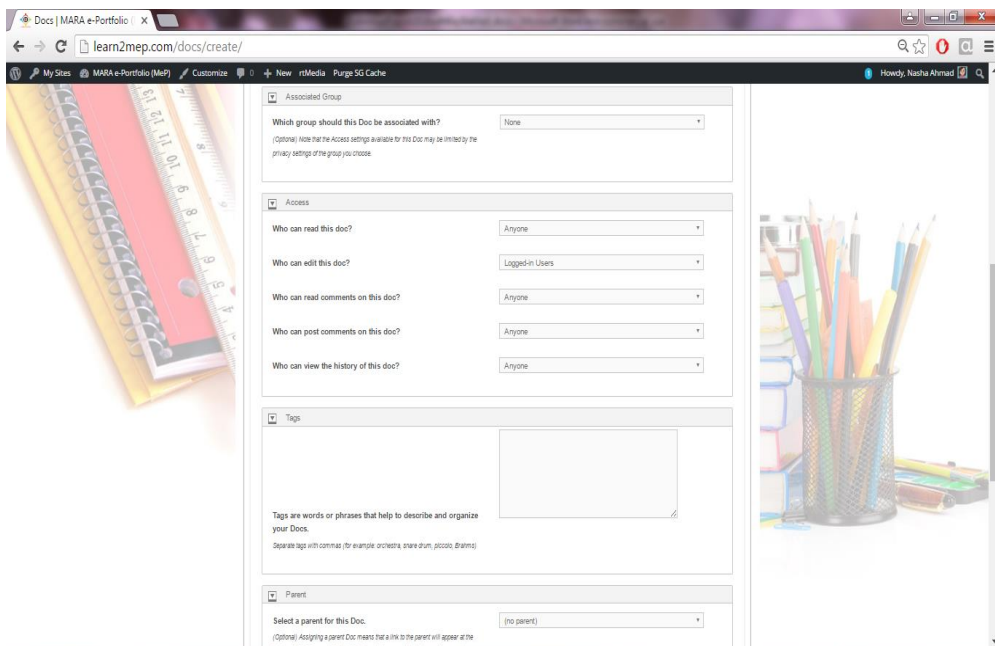


Figure B.0.16: Settings features for document creation

## Appendix C – Post-survey



### Department of Computer Science

#### Questionnaire

Dear student,

My name is Monisa Abdul Wahab. I am a postgraduate student at University of Warwick, United Kingdom. I am doing a research on user engagement issues in e-portfolio application. The purpose of this questionnaire is to investigate students' perception of e-portfolio and factors that increase user (student) engagement towards e-portfolio application.

You have been identified as an individual who would meet the criteria for my research. I would be grateful if you would agree to participate in my study. Your participation is voluntary and your responses will remain strictly confidential.

The survey is located online at the Department of Computer Science, University of Warwick's website at <http://www2.warwick.ac.uk/fac/sci/dcs/research/edtech/surveys/monisa>. The collected data will be analysed by me. The survey will take approximately 20 minutes to complete. Please be aware that the Department's ethical rules and procedures have been followed, and ethical consent has been granted for this questionnaire from the Department and from MARA Higher Education Division (*Bahagian Pendidikan Tinggi MARA*) and from the Research Ethics & Governance Office (REGO), Warwick Medical School, University of Warwick **REGO-2014-916 dated 15 July 2014**.

Item in this questionnaire has been developed to address the following elements: demographics, prior experiences with technology, e-portfolio creation and development, prior experiences in games application and perception, gamified features in e-portfolio, learning experiences, and future use.



Please let me know if you have any questions regarding this study. Feel free to contact me at M.Abdul-Wahab@warick.ac.uk.

Thank you very much for your time and cooperation.

Monisa Abdul Wahab

**A. Demographics**

*(Please note you information will **not** be sold or given to outside entities. It is for research use only)*

Name:

\_\_\_\_\_

Student ID Number: \_\_\_\_\_

Age *(Please specify)*: \_\_\_\_\_

College *(Please V one)*:

MARA Professional College Beranang	
MARA Professional College Indera Mahkota	
MARA Professional College Bandar Melaka	

Program *(Please V one)*:

HND in Computing (System Development) – HND SYD	
Diploma in Computer Networking – DCN	
Diploma in English Communication – DEC	
Diploma in Entrepreneurship – DEn	
Diploma in Accountancy – DIA	
Diploma in Creative Digital Media Production – DCD	

Semester *(Please circle one)*:

1 / 2/ 3/ 4/ 5/ 6/ 7

Gender (Please *v* one):


Female	
Male	

Internet access evaluation

No.	Questions	<i>v</i> Yes	X No
1.	Do you have internet access at home?		
2.	Do you have internet access at college?		
3.	Is your internet reliable?		
4.	Do you have problem accessing the Internet?		

**A. Student feedback on the advantages of e-portfolios**

On a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how e-portfolio has helped you with your current courses?

No.	Item/Scale				
		1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
1.	Provided a place to store examples of coursework				
2.	Allowed me to keep track of learning activities and be able to reflect on any weak areas				
3.	Allowed me to evaluate and reflect on my learning progress (showcase my best work and identify weaknesses)				
4.	Allowed access to all my coursework and assessment items				
5.	Allowed me to store examples of my extra-curricular activities related to my future career				
6.	Helped me to become a more effective and independent learner				
7.	Helped me to organize my work to prepare for future employment				

8.	Helped me to easily access my previous work for future references				
9.	Helped me to share my work with others				
10.	Helped me to collaborate with others				

### B. Student opinion on gamified e-portfolios


Based on your experiences in creating your own e-portfolio, on a scale of 1-5 (1=strongly disagree 2=disagree, 3=neutral, 4=agree, 5=strongly agree), rate how do you feel about e-portfolio?

No.	Item/Scale				
		1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
1.	Very enjoyable				
2.	Is a 'burden' to me				
3.	Is difficult to create				
4.	Has made me more interested in my work				
5.	Has taken up too much time in class				
6.	Has taken up too much time outside class				
7.	Is good to do with other students				
8.	Helps me collaborate with my peer friends				
9.	Tells me about what my friends are learning				
10.	Helps me think more about my own learning				
11.	Gives me enough space to store all work that I need.				
12.	Makes me become more concern about my work				
13.	Helps me to organised my work better				
14.	Helps me to show people what I'm really good at				
15.	Gives me new ways of presenting my work using technology				
16.	Helps me to be creative				
17.	Helps me to be confident to show/share my work				
18.	Helps me to plan how to improve my knowledge				
19.	Helps me judge whether I have				

	improved over time				
20.	Is good for showing my progress				
21.	Has helped me understand my work better				
22.	Has made me feel good about my achievements				
23.	Is something I would like to do again in the future				
24.	Has helped me to learn				
25.	Very easy to do				
26.	Encourage me to do things that are not usually done by me				
27.	Helped us to provide feedback to each other's work				
28.	Has made me update my portfolio frequently				
29.	I feel unhappy when updating my e-portfolio				
30.	I feel worried when updating my e-portfolio				
31.	I feel exhausted when updating my e-portfolio				

### C. Student feedback on the advantages of e-portfolio with "GAMIFIED" elements

When using e-portfolios application, assess how the game elements in the e-portfolio helps you to keep using the application? (Use scale 1-5, 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree)

No.	Item/Scale				
		1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
1.	Provide useful feedback for me to improve my e-portfolio				
2.	Provide a summary of my e-portfolio content so that I know my progress				
3.	Reward points and/or badges when I complete a task				
4.	Inform the current status via leaderboard				

5.	Notifications period of inactivity to remind me to update the e-portfolio				
6.	Rewards points accumulated will encourage me to update the e-portfolio				
7.	Make me want to compete with my friends to update my e-portfolio				
8.	Encourage me to visit the e-portfolio more often				
9.	Encourage me to give comments to friend's artifact in the e-portfolio				
10.	Encourage me to upload and share learning evidences in the e-portfolio more often				
11.	Encourage me to communicate with my friends and lecturers				

#### D. Current experiences with e-portfolio creation and development

No.	Questions	√ Yes	X No
1.	I have already heard of the e-portfolio concept		
2.	I already know what e-portfolio means		
3.	I already know what should be included in an e-portfolio		
4.	I have already had a paper-based portfolio of my learning experiences		
5.	I spend at least 1 hour to update my portfolio daily		

I update my portfolio....

Daily	
Weekly	
Monthly	
Less than monthly	

In your opinion, which of the following items should be included in the e-portfolio?  
(select all that apply)

Profile page	
Professional Resume	
Personal Autobiography	
Curriculum/coursework record	
Extra-curricular activities	
Second language skills	
Work experiences	
Awards and prizes	
Recommendations by lecturers or employers	
Other skills	
Links to other system such as MyLMS (kpmim)	
Links to personal blog	
Links to social networking sites such as Facebook	
Multimedia materials (e.g. audio or video clips related to your learning activities)	
Notification of you inactivity duration	
Notification of your last update of the e-portfolio content	

#### E. MARA ePortfolio evaluations

##### Engagement

No.	Questions	√ Yes	X No
1.	I wanted to complete available task in the e-portfolio		
2.	I wanted to explore all of the options available to me		
3.	I did not care how the task ended		
4.	I found the task satisfying		
5.	I felt absorbed in the task		
6.	I felt time passed by quickly		
7.	I felt excited during the task		

##### Motivation

No.	Questions	√ Yes	X No
1.	I enjoyed working on my portfolio		

2.	I am satisfied with my portfolio		
3.	I think it is a good thing that others can access my portfolio via the Internet		

### Learning

No.	Questions	✓ Yes	X No
1.	Doing task in e-portfolio improves me learning performance		
2.	Doing task in e-portfolio increases my productivity		
3.	Doing task in e-portfolio enhances my learning effectiveness		
4.	Doing task in e-portfolio helps to achieve better grades		

### Usability

No.	Questions	✓ Yes	X No
1.	I think I would use this gamified e-portfolio		
2.	I found the gamified e-portfolio unnecessarily complex		
3.	I thought the gamified e-portfolio was easy to use		
4.	I think I would need the support of a technical person to be able to use the gamified e-portfolio		
5.	I found the various functions in the gamified e-portfolio were well integrated		
6.	I thought there was too much inconsistency in this gamified e-portfolio		
7.	I would imagine that most people would learn to use this gamified e-portfolio very quickly		
8.	I found the gamified e-portfolio very cumbersome to use		
9.	I felt very confident using the gamified e-portfolio		
10.	I needed to learn a lot of things before I could get going with this gamified e-portfolio		

## Appendix D – Interview

### Interview questions

#### Sesi pengenalan

#### Ice-breaking

1. *Apa nama anda?*  
What is your name?
2. *Apa kursus yang anda sedang ambil dan semester berapa?*  
What course are you in and in what semester?
3. *Adakah anda mempunyai portfolio berasaskan-kertas?*  
Do you have a paper-based portfolio?
4. *Adakah anda mempunyai e-portfolio?*  
Do you have an e-portfolio?
5. *Adakah anda suka permainan komputer?*  
Do you like computer games?
6. *Adakah anda pernah bermain apa-apa permainan komputer berasaskan pendidikan?*  
Have you played any educational games?
7. *Apakah yang anda rasa ketika bermain dengan permainan komputer?*  
What do you feel when playing computer games?



8. *Adakah anda mempunyai pengalaman menggunakan aplikasi gamifikasi sebelum menggunakan MeP?*

Do you have previous gamification experience before using MeP?

9. *Adakah anda merasakan gamifikasi (elemen permainan di dalam aplikasi bukan permainan) adalah wajar/ sesuai dalam konteks pendidikan?*

Do you think gamification (including game elements in a non-games application/task) is appropriate within education?

10. *Adakah anda suka berkongsi hasil kerja terbaik anda secara dalam talian?*

Do you like to share your best work online?

11. *Kenapa anda suka berkongsi hasil kerja terbaik dalam talian?*

Why do you want to share your best work online?

12. *Adakah anda suka menerima komen/maklum balas kerja yang anda kongsi? Mengapa?*

Do you like to receive comments of your shared work? Why?

13. *Adakah anda suka memberi komen/maklum balas kepada kerja yang dikongsi oleh rakan anda? Mengapa?*

Do you like to give comments to your friends shared work? Why?

### Kebolehgunaan

#### Usability

1. *Berapa kali dalam seminggu (secara purata) anda melawat MeP?*

How many times in a week (average) do you visit the MeP?

2. *Berapa lama anda berada di laman MeP secara purata di setiap kali lawatan anda?(secara jangkaan dalam minit atau jam)*  
How long do you spend (estimation in minutes or hours) in average for each MeP visit?
  
3. *Adakah anda fikir masa yang anda luangkan berinteraksi dengan kandungan MeP adalah berbaloi?*  
Do you think your time spent interacting with the MeP content are worth the visit?
  
4. *Adakah MeP mudah digunakan?*  
Is it easy to use?
  
5. *Adakah anda menghadapi sebarang masalah ketika menggunakannya? Sila jelaskan.*  
Do you have any difficulties using it? Can you explain?
  
6. *Apakah jenis aktiviti yang anda lakukan di dalam MeP? (contoh, membaca, mengambil bahagian dalam forum, memuat naik bahan pembelajaran, berkomunikasi dengan rakan-rakan, menulis blog)*  
What kind of activities do you do in MeP? (reading, participate in forum, upload learning evidences, communicating with friends, blogging)
  
7. *Laman apakah yang anda sering lawati dalam MeP? Mengapa anda kerap melawatnya?*  
What page do you frequently visit in MeP? Why do you visit it frequently?
  
8. *Adakah anda rasa interaksi dengan MeP membuatkan anda bersedia untuk kelas anda?*  
Do you feel interactions with MeP somehow prepare you for class?

9. *Adakah anda rasa interaksi dengan MeP menggalakkan anda untuk mengubah tingkah laku seperti...*

Do you feel the interactions within MeP encourage you to change your behavior like...

- a. *meningkatkan kekerapan lawatan ke MeP*  
improve your visits to MeP?
- b. *memuat naik dan berkongsi lebih artifak?*  
upload and share more artifacts?
- c. *memberi maklum balas terhadap artifak rakan?*  
give feedback to friends' artifacts?
- d. *mencapai lebih sumber elektronik?*  
accessing more electronic resources?
- e. *melihat lebih kandungan di dalam MeP?*  
viewing more content in MeP?
- f. *menerbitkan lebih kandungan dalam MeP?*  
publishing more content in MeP?
- g. *lebih kerap mengemaskini status?*  
frequently updating your status?
- h. *membuat rakan baru yang lebih?*  
make more friends?
- i. *melibatkan diri dalam forum?*  
participating in forums?

## Elemen permainan

### Games element

1. *Adakah anda tahu apa itu unsur/elemen permainan?*  
Do you know what game elements are?
2. *Adakah anda fikir markah, lencana dan papan pencapaian adalah bagus untuk anda? Mengapa?*  
Do you think points, badges and leaderboard in MeP is good for you? Why?
3. *Apakah yang anda rasa mengenai penerimaan markah dan lencana untuk melayari kandungan e-portfolio?*  
What do you feel about getting points and badges for browsing the e-portfolio content?
4. *Apakah yang anda rasa apabila menerima markah/lencana?*  
What do you feel when you receive a point/badge?
5. *Apakah yang anda rasa apabila melihat nama anda pada 5 pengguna tertinggi di dalam papan pencapaian?*  
What do you feel when seeing your name as the top 5 users in the leaderboard?
6. *Adakah elemen/unsur permainan membuatkan anda bekerja keras untuk terlibat dalam sistem e-portfolio?*  
Do the games elements make you work hard to participate within the e-portfolio system?
7. *Adakah elemen/unsur permainan menggalakkan anda untuk melawati e-portfolio tersebut? Bagaimana?*  
Do the games elements encourage you to visit the e-portfolio? How?
8. *Adakah elemen/unsur permainan membuatkan anda mengemaskini e-portfolio anda dengan lebih kerap?*  
Do the games elements make you update your e-portfolio frequently?

9. *Adakah elemen/unsur permainan menggalakkan anda memberi komen pada bahan bukti pembelajaran rakan anda?*

Do the games elements encourage you to give comments to your friends learning evidences?

10. *Adakah anda bersetuju bahawa elemen/unsur permainan membuatkan anda ingin bersaing dengan rakan-rakan anda?*

Do you agree that somehow the games elements make you want to compete with your friends?

11. *Adakah anda bersetuju bahawa elemen/unsur permainan mempengaruhi anda untuk memuat naik dan berkongsi lebih bahan bukti pembelajaran di dalam sistem e-portfolio?*

Do you agree that somehow the games elements influence you to upload and share more learning evidences in the e-portfolio system?

12. *Adakah anda rasa anda telah capai sesuatu apabila anda menerima markah dan/atau lencana?*

Do you feel a sense of achievements when you receive points and/or badges?

13. *Adakah anda rasa markah dan lencana yang diperolehi menunjukkan anda melakukan perkembangan?*

Do you feel the earned points and badges shows you are progressing?

14. *Adakah markah dan lencana membuatkan anda melakukan tugas yang mungkin tidak akan anda lakukan sekiranya tanpa markah dan lencana tersebut? (contoh, mengemaskini profil anda) Mengapa?*

Do points and badges make you do task which you may not be doing without it (e.g. update your profile)? Why?

15. *Apakah pendapat keseluruhan anda mengenai elemen/unsur permainan di dalam MeP?*

What is your overall impression of the games elements in MeP?

16. *Adakah anda akan menggunakan MeP untuk merancang perkembangan personal anda? Mengapa?*

Will you use MeP to plan your personal development? Why?

17. *Pada pendapat anda, apakah aspek terbaik dan terburuk dalam e-portfolio dengan gamifikasi ini?*

In your opinion, what are the best and the worst aspects of the gamified e-portfolio?

18. *Adakah anda mempunyai apa-apa cadangan untuk penambahbaikan e-portfolio dengan gamifikasi ini?*

Do you have any suggestions to improve the gamified e-portfolio?

### Elemen sosial

#### Social element

1. *Adakah anda menyedari kewujudan elemen sosial seperti blog dan forum di dalam aplikasi?*

Do you aware of the social elements like blog and forum in the system?

2. *Adakah anda suka elemen sosial tersebut dan apa pendapat anda mengenai blog dan forum tersebut?*

Do you like the social elements and what is your opinion of the blog and forum features?

### Elemen pemilikan

#### Ownership element

1. *Adakah anda rasa anda mempunyai kuasa sepenuhnya terhadap e-portfolio anda dan kenapa anda rasa begitu?*

Do you feel that you have a full control of your e-portfolio and why do you feel like that?

2. *Adakah anda rasa anda memiliki e-portfolio yang anda bina? Nyatakan sebab bagi jawapan anda.*

Do you feel that you own your created e-portfolio? Please state the reasons for your answer.

## Appendix E – Sample of Interview Transcripts

### Transkrip temuduga

Penemubual: Monisa Abdul Wahab (MAW)

Pelajar01: Izzati Nazihah (IN)

Bilangan temubual: 1

Tarikh temubual:

Masa mula temubual:

Masa tamat temubual:

Jangkamasa temubual: 16:04:9

Lokasi temubual: Perpustakaan KPMIM

Tajuk temubual: Persepsi Pelajar Tentang Aplikasi MARA ePortfolio (MeP)

MAW	Assalamualaikum, perkenalkan nama, kursus dan semester
IN	Nama saya Izzati Nazihah..boleh panggil Zizie je. Saya course Diploma in English Communication..semester 4.
MAW	Semester 4..Adakah anda mempunyai portfolio sendiri? Maksudnya..fail yang simpan segala bahan-bahan belajar.
IN	Aaa...ada
MAW	Ada... <i>paper-based</i> ?
IN	Yang biasa punya...dokumen biasa...
MAW	Dokumen biasa laa...folder biasa..
IN	Folder biasa...
MAW	Adakah anda mempunyai <i>electronic portfolio</i> ? Maksudnya yang disimpan secara <i>online</i> ..
IN	Aaa...ada.
MAW	Ada...simpan di mana?
IN	Dekat drive Google..
MAW	Google drive...?
IN	Google drive...
MAW	Ok...adakah anda suka bermain <i>computer games</i> ?
IN	Aa..suka.
MAW	Suka...Ok. Pernahkah anda main apa-apa <i>games</i> yang berunsurkan pendidikan?
IN	Aaa...biasa yang pasal <i>vocabulary</i> tu...
MAW	<i>Vocabulary</i> ...ok...Apa perasaan anda bila main <i>computer games</i> tu?
IN	Aaaa....rasa macam...kalau yang ada...score semua tu...dia rasa competitive la...rasa macam addicted la....dengan permainan tu...
MAW	Adakah anda mempunyai pengalaman gamification sebelum menggunakan electronic portfolio? Gamification ni maksudnya menggunakan sebarang aplikasi yang mempunyai game elements...
IN	Game elements...macam?
MAW	Contoh macam aplikasi yang award points/ memberi mata ganjaran...aplikasi yang bagi badge.....pernah main (guna)?
IN	Pernah..pernah...



MAW	Pada pendapat anda...adakah anda fikir gamification ni..sesuai dengan pendidikan? Sesuai atau tidak dengan sector pendidikan?
IN	Sesuai..
MAW	Kenapa anda rasakan gamification ni sesuai?
IN	Sebab aaa...kalau gamification ni...kalau yang ada...macam...score-score semua tu...itu akan membuatkan orang rasa...macam untuk compete laa...so, bila compete tu...dalam education akan buat diorang (pelajar) ada effort..aaa..
MAW	Ok...Adakah anda kerap berkongsi sebarang bahan-bahan (belajar) secara online? Terutamanya bahan pembelajaran...
IN	Aaa...su-suka jugak...
MAW	Suka berkongsi secara online...
IN	Suka berkongsi...
MAW	Ok...Kenapa anda suka berkongsi bahan pembelajaran secara online?
IN	Sebab...bila kita dah ada satu ilmu atau knowledge tu...so kita nak kongsi dengan orang lain supaya orang lain tahu jugak...ilmu dengan knowledge tu..
MAW	Adakah anda suka menerima komen terhadap bahan pembelajaran yang anda share secara online?
IN	Suka..(gelak kecil..)
MAW	Kenapa suka menerima komen?
IN	Sebab..kalau kita dah share dekat orang maklumat tu...so kita nak tahu sama ada diorang rasa maklumat tu betul ke... tak ke....so bila diorang ada komen...at the same time diorang aka nada questions untuk Tanya kat kita...so kita boleh jawab..
MAW	Ok..untuk information dan untuk kita clarify lah..
IN	Aaa...confirmation and clarification...
MAW	Adakah anda suka memberi komen terhadap apa yang rakan-rakan share secara online?
IN	Aaa..kalau...rasa ada additional information..aa itu saya akan komen..untuk tam..tambahan maklumat..
MAW	Kenapa nak bagi komen?
IN	Aaa...sebab macam...kalau kita rasa diorang macam..diorang punye information tak cukup..so kita nak komen..kita nak bagi diorang lebih..tak pun nak memperbetulkan kalau diorang tersalah bagi information..
MAW	Tersalah (bagi) maklumat..?
IN	Aaa..
MAW	Ok..soalan-soalan seterusnya berkaitan dengan kebolegunaan MARA ePortfolio itu sendiri ya..
IN	Hmm..
MAW	Ok...secara purata dalam seminggu..berapa kali anda melawat MARA ePortfolio? Secara purata...
IN	Secara purata dalam seminggu...dalam sehari tu adalah 4-5 kali..
MAW	Sehari..4-5 kali...
IN	Aaa..
MAW	Ok..untuk satu sesi lawatan terhadap MARA ePortfolio tu, berapa lama yang anda spend..dalam MARA ePortfolio? Secara purata lah..berapa minit..berapa jam..?
IN	Satu lawatan...20 ke 30 minit
MAW	20 hingga 30 minit...Ok. Adakah anda merasakan masa yang anda gunakan untuk berinteraksi dengan MARA ePortfolio tu..berbaloi dengan setiap kali lawatan?

IN	Aa..berbaloi laa jugak
MAW	Ok..kenapa anda rasakan ianya berbaloi?
IN	Sebab...MeP tu...dia ada..satu..element dimana macam gamification tu la...dia ada dia punye score dia..points dia....and then dia ada dia punye..content dia..bila kita tengok, oo kita tau benda ni dah update ke belum..benda ni belum update ke...
MAW	Adakah MARA ePortfolio itu senang digunakan?
IN	Senang diguna..
MAW	Senang digunakan...Adakah anda menghadapi sebarang masalah apabila menggunakan MARA ePortfolio?
IN	Aaa...ada satu. Dia macam...serabut sikit kadang-kadang..
MAW	Tak berapa tersusun lah? Content ke..?
IN	Content dia tersusun, dia macam..bila orang bagi info macam...serabut...apa ni? Apa ni? Aa.. macam tu...
MAW	Maksudnya, terlampau banyak info? Ke..macam mana?
IN	Terr..lampau banyak info..
MAW	Atau pun dari segi susunan ke?
IN	Dari segi susunan...ok. Maybe sebab terlalu banyak info kot..yang di update dalam tu..
MAW	Terlalu banyak info...ok. Aktiviti apa yang anda selalu lakukan dalam MeP? Contoh macam...adakah anda membaca content..ataupun forum..ataupun upload something?
IN	Aa..semua tu. Ada jugak tengok content dia...upload info..and saya ada melawat yang untuk blog tu....aa blogging tu...
MAW	So..ape pendapat anda tentang blogging tu?
IN	Blogging tu...bagus la jugak. Boleh update info dalam tu...
MAW	Adakah anda update blog anda sendiri? Adakah anda ada create blog anda dalam MeP?
IN	Aa..ada.
MAW	Ok..kalau diberi peluang, adakah anda akan kemaskini blog anda..dan apa maklumat yang anda akan share?
IN	Macam knowledge, information..macam general knowledge semua tu..tak pun pasal course..mmm..
MAW	Ok..dalam MeP tersebut, laman apa yang anda kerap lawati?
IN	Group.
MAW	Group..kenapa anda kerap lawat Group?
IN	Sebab dekat Group tu...kalau ada info yang nak kena update...aa update kat situ...pastu tengok Group orang lain punye jugak..macam ada update punye info..
MAW	Ok..adakah anda merasakan interaksi dengan MeP somehow membuatkan anda prepare untuk satu-satu kelas atau satu-satu subjek?
IN	Mmmm.....maksudnya macam mana tu?
MAW	Dengan berinteraksi dengan MeP, adakah anda merasakan anda melakukan persediaan untuk satu-satu subjek atau satu-satu kelas?
IN	Kalau dari segi...kelas...(terdiam dan berfikir)
MAW	Contoh, katakan anda berinteraksi dalam forum, adakah dengan interaksi dalam forum tu membuatkan anda rasa anda bersedia untuk masuk ke kelas bagi sesuatu subjek?
IN	Ooo..kalau dah di update information tu...rasa bersedia laa...kalau dah diberitahu apa yang perlu dibuat ke ape...

MAW	Adakah dengan participation daripada pensyarah sendiri membuatkan anda rasa e-portfolio itu menarik?
IN	Aa...iye.
MAW	Ok..ape perasaan anda untuk interaksi dalam e-portfolio tu, adakah e-portfolio menggalakkan anda mengubah behavior/your own behavior towards let say macam improve your visits...macam notifikasi tu dia menggalakkan anda...MeP ada bagi notifikasi dalam emel kan?
IN	Ahaa...
MAW	Dengan notifikasi dalam profile..
IN	Dekat tepi tu...
MAW	Apa pendapat anda tentang notifikasi ni?
IN	Ia sangat bagus sebab dia bagitau kita..notification dia bagitau kita lah apa yang..apa yang dah diupdate semua..
MAW	Dari segi upload bahan-bahan pembelajaran, adakah anda rasa MeP itu membantu dan menggalakkan?
IN	Haa..membantu dan menggalakkan.
MAW	Dari segi kemudahan untuk memberi feedback kepada rakan-rakan?
IN	Membantu jugak.
MAW	Dari segi capaian kepada sumber-sumber elektronik? Contoh macam rakan-rakan upload dokumen atau artikel, adakah ia membantu?
IN	Aha..membantu jugak.
MAW	Dari segi viewing more content, maksudnya adakah MeP menyediakan platform untuk anda view lebih content?
IN	Ahaa..dia bagi view. Tak private dalam tu..so kita boleh view.
MAW	Dari segi publishing content?
IN	Pun bagus jugak.
MAW	Update status?
IN	Pun bagus jugak.
MAW	Menambah rakan-rakan?
IN	Pun bagus jugak..(gelak kecil)
MAW	Dan last sekali forum..apa pendapat anda tentang forum?
IN	Forum tu bagus...aa dari segi forum tu lah..dia macam ada...serabut dia sikit tu..sebab kadang-kadang orang update dekat status, kadang-kadang orang update dalam group. Tapi kan, bahagian satu tempat tu...ada update status dengan forum. Haa.. yang tu kita confuse sikit.
MAW	Ok..yang dekat Groups dengan Forum tu la...
IN	Dia ada macam...homepage untuk Groups tu...
MAW	Ok..ok..so, soalan-soalan seterusnya berkaitan dengan game elements la...unsur-unsur gamification dalam MeP. Sebelum ini, adakah anda tahu apa itu unsur-unsur games? Ataupun, what is games element?
IN	Tak berapa nak tau...
MAW	Tak berapa tahu. So, sekarang ni tahu tak apa itu games element?
IN	Tahu..
MAW	So, apa itu games element?
IN	Games element tu, yang ada...ala dia macam...yang ada untuk skor-skor tu laa...
MAW	So, games element adalah..contohnya ciri-ciri games seperti mata ganjaran/points, badges, leaderboard dan banyak lagi lah...ok itu ialah games element.

	Pendapat anda tentang points, badges dan leaderboard dalam MeP, adakah ianya baik untuk anda ataupun untuk user?
IN	Aa..dia baik untuk user.
MAW	Kenapa anda katakana games element tu baik untuk user?
IN	Sebab kat situ kita boleh tengok sampai mana tahap pencapaian kita.
MAW	Apa yang anda rasa bila menerima points dan badges, bila anda browse content dalam MeP? Apa perasaan anda bila terima point?
IN	Kat situ...dia rasa macam...lagi menggalakkan untuk mengguna..forum tu.
MAW	Apa perasaan anda bila tengok nama anda dekat leaderboard tu?
IN	Aa..perasaan tu..lagi menggalakkan lah. Dia lagi nak menggalakkan kita untuk guna.
MAW	Apa perasaan anda apabila nama anda berada di top ten?
IN	Lagi nak jadi top! (gelak)
MAW	Apa perasaan anda bila tengok nama di lima terakhir?
IN	Aa..itu..itu yang kita nak improve kan, untuk kita naik ke atas.
MAW	Adakah anda setuju dengan adanya games element membuatkan anda bekerja lebih kuat untuk participate dalam e-portfolio system itu sendiri?
IN	Aa..iye.
MAW	Adakah anda setuju, games element tu menggalakkan anda melawat e-portfolio itu sendiri?
IN	Aa..iye.
MAW	Macam mana games element tu menggalakkan?
IN	Dia bila kita lawat kemana-mana, dia akan diberi points. Lepas tu points tu akan ada notification untuk points tu.
MAW	Ok..untuk games element ni, adakah anda rasakan games element ni membuatkan anda rasa nak update status dengan lebih kerap?
IN	Haa..iye.
MAW	Adakah games element tu menggalakkan anda memberi komen kepada apa yang rakan anda letak di MeP?
IN	Memberi komen?
MAW	Ya.
IN	Aa..iye.
MAW	Let say macam rakan anda letak satu gambar, adakah games element menggalakkan anda memberi komen?
IN	Aa..dia menggalakkan.
MAW	Adakah anda setuju, somehow games element tu membuatkan anda rasa nak compete dengan rakan-rakan?
IN	Aa..setuju.
MAW	Adakah anda setuju, somehow games element tu dia influence anda untuk upload dengan share lebih learning evidences.
IN	Setuju.
MAW	Adakah anda merasakan sense of achievement bila menerima points dengan badges?
IN	Haa..iye.
MAW	Adakah dengan menerima points dengan badges tu..anda merasakan yang anda progressing?
IN	Iye.
MAW	Adakah points dengan badges tu membuatkan anda melakukan aktiviti yang anda takkan lakukan sekiranya takde points dengan badges?
IN	Aa..apa dia?

MAW	Adakah dengan adanya points dengan badges tu membuatkan anda melakukan aktiviti yang takkan anda lakukan kalau takde points dengan badges?
IN	Aa..ye, ye..
MAW	Contoh macam upload something..ataupun forum, kalau takde points, takde badges maksudnya kosong tanpa semua tu..adakah anda masih melakukannya?
IN	Dia tak berapa sebanyak yang ada points tu lah..
MAW	Overall impressions of games element dalam MeP means overall impressions of badges and leaderboard?
IN	Ia sangat bagus
MAW	Kenapa you rasa ia sangat bagus?
IN	Sebab benda ni..kita akan tahu pencapaian kita. Lepas tu benda ni..menggalakkan and lagi mengimprovekan kita untuk..gunakan..aa dari segi education la..
MAW	Adakah anda menyedari kewujudan elemen social seperti blog dan forum di dalam aplikasi?
IN	Ya, saya perasan ada blog dan forum dalam aplikasi yang saya guna...
MAW	Adakah anda suka elemen sosial tersebut dan apa pendapat anda mengenai blog dan forum tersebut?
IN	Ya, saya suka sebab saya dapat berbincang dengan kawan-kawan mengenai tugas yang diberi dalam forum dan blog membolehkan saya menulis apa yang saya rasa...
MAW	Adakah anda rasa anda mempunyai kuasa sepenuhnya terhadap e-portfolio anda dan mengapa?
IN	Ya, sebab...saya boleh letak apa sahaja bahan yang saya rasa perlu dan buang yang tidak perlu. Saya juga boleh tentukan apa yang ingin saya kongsi atau tak.
MAW	Adakah anda rasa e-portfolio itu milik anda dan kenapa?
IN	Ya, kerana saya yang bina e-portfolio tersebut beserta bahan-bahan di dalamnya..
MAW	Sekiranya kita buat improvement pada kelemahan-kelemahan dalam sistem MeP ini, adakah anda akan menggunakannya pada masa hadapan untuk personal development?
IN	Aa..iye, insha Allah..(senyum)
MAW	Kenapa agaknya?
IN	Sebab kat situ...dia ada segala macam..dia punye data dia..dia punye information tu..dia update dalam tu..contoh macam notification, kita tau apa yang kita dah buat, apa yang kita belum buat..
MAW	Pada pendapat anda, apakah ciri-ciri terbaik dan terburuk dalam aplikasi MeP?
IN	Ciri terbaik..benda tu boleh upload banyak information, ada yang games element tu...semuanya ok lah dalam tu..kecuali satu je lah..yang satu ciri tu...dia agak serabut tu.
MAW	Ada cadangan tak untuk improve aplikasi tersebut?
IN	Untuk improve...mungkin kena asingkan bahagian update status dengan update dalam group.
MAW	Lain-lain cadangan?
IN	Tak ada.
MAW	Ok...terima kasih..
IN	Sama-sama..

## Appendix F – Coding of Interview transcripts (sample)

Penemubual: Monisa Abdul Wahab (MAW)

Pelajar: 01 (IN)

Nama	Transkripsi	Kod
MAW	Assalamualaikum, perkenalkan nama, kursus dan semester	
IN	Nama saya IN..boleh panggil IN je. Saya course Diploma in English Communication..semester 4.	BACKGROUND
MAW	Semester 4..Adakah anda mempunyai portfolio sendiri? Maksudnya..fail yang simpan segala bahan-bahan belajar.	
IN	Aaa...ada	BACKGROUND
MAW	Ada... <i>paper-based</i> ?	
IN	Yang biasa punya...dokumen biasa...	BACKGROUND
MAW	Dokumen biasa laa...folder biasa..	
IN	Folder biasa...	BACKGROUND
MAW	Adakah anda mempunyai <i>electronic portfolio</i> ? Maksudnya yang disimpan secara <i>online</i> ..	
IN	Aaa...ada.	BACKGROUND
MAW	Ada...simpan di mana?	
IN	Dekat drive Google..	BACKGROUND
MAW	Google drive...?	
IN	Google drive...	BACKGROUND
MAW	Ok...adakah anda suka bermain <i>computer games</i> ?	
IN	Aa..suka.	BACKGROUND
MAW	Suka...Ok. Pernahkah anda main apa-apa <i>games</i> yang berunsurkan pendidikan?	
IN	Aaa...biasa yang pasal <i>vocabulary</i> tu...	BACKGROUND
MAW	<i>Vocabulary</i> ...ok...Apa perasaan anda bila main <i>computer games</i> tu?	
IN	Aaaa....rasa macam...kalau yang ada...score semua tu...dia rasa competitive la...rasa macam addicted la....dengan permainan tu...	BACKGROUND
MAW	Adakah anda mempunyai pengalaman gamification sebelum menggunakan electronic portfolio? Gamification ni maksudnya menggunakan sebarang aplikasi yang mempunyai game elements...	
IN	Game elements...macam?	
MAW	Contoh macam aplikasi yang award points/ memberi mata ganjaran...aplikasi yang bagi badge.....pernah main (guna)?	
IN	Pernah..pernah...	BACKGROUND
MAW	Pada pendapat anda...adakah anda fikir gamification ni..sesuai dengan pendidikan? Sesuai atau tidak dengan sector pendidikan?	
IN	Sesuai..	BACKGROUND
MAW	Kenapa anda rasakan gamification ni sesuai?	

<b>Nama</b>	<b>Transkripsi</b>	<b>Kod</b>
IN	Sebab aaa...kalau gamification ni...kalau yang ada...macam...score-score semua tu...itu akan membuatkan orang rasa...macam untuk compete laa...so, bila compete tu...dalam education akan buat diorang (pelajar) ada effort..aaa..	BACKGROUND
MAW	Ok...Adakah anda kerap berkongsi sebarang bahan-bahan (belajar) secara online? Terutamanya bahan pembelajaran...	
IN	Aaa...su-suka jugak...	BACKGROUND
MAW	Suka berkongsi secara online...	
IN	Suka berkongsi...	BACKGROUND
MAW	Ok...Kenapa anda suka berkongsi bahan pembelajaran secara online?	
IN	Sebab...bila kita dah ada satu ilmu atau knowledge tu...so kita nak kongsi dengan orang lain supaya orang lain tahu jugak...ilmu dengan knowledge tu..	BACKGROUND
MAW	Adakah anda suka menerima komen terhadap bahan pembelajaran yang anda share secara online?	
IN	Suka..(gelak kecil..)	BACKGROUND
MAW	Kenapa suka menerima komen?	
IN	Sebab..kalau kita dah share dekat orang maklumat tu...so kita nak tahu sama ada diorang rasa maklumat tu betul ke...tak ke...so bila diorang ada komen...at the same time diorang aka nada questions untuk Tanya kat kita...so kita boleh jawab..	BACKGROUND
MAW	Ok..untuk information dan untuk kita clarify lah..	
IN	Aaa...confirmation and clarification...	BACKGROUND
MAW	Adakah anda suka memberi komen terhadap apa yang rakan-rakan share secara online?	
IN	Aaa..kalau...rasa ada additional information..aa itu saya akan komen..untuk tam..tambahan maklumat..	BACKGROUND
MAW	Kenapa nak bagi komen?	
IN	Aaa...sebab macam...kalau kita rasa diorang macam..diorang punye information tak cukup..so kita nak komen..kita nak bagi diorang lebih..tak pun nak memperbetulkan kalau diorang tersalah bagi information..	BACKGROUND
MAW	Tersalah (bagi) maklumat..?	
IN	Aaa..	BACKGROUND
MAW	Ok..soalan-soalan seterusnya berkaitan dengan kebolegunaan MARA ePortfolio itu sendiri ya..	
IN	Hmm..	
MAW	Ok...secara purata dalam seminggu..berapa kali anda melawat MARA ePortfolio? Secara purata...	
IN	Secara purata dalam seminggu...dalam sehari tu adalah 4-5 kali..	USABILITY
MAW	Sehari..4-5 kali...	
IN	Aaa..	USABILITY
MAW	Ok..untuk satu sesi lawatan terhadap MARA ePortfolio tu, berapa lama yang anda spend..dalam MARA ePortfolio? Secara purata lah..berapa minit..berapa jam..?	

Nama	Transkripsi	Kod
IN	Satu lawatan...20 ke 30 minit	USABILITY
MAW	20 hingga 30 minit...Ok. Adakah anda merasakan masa yang anda gunakan untuk berinteraksi dengan MARA ePortfolio tu..berbaloi dengan setiap kali lawatan?	
IN	Aa..berbaloi laa jugak	USABILITY
MAW	Ok..kenapa anda rasakan ianya berbaloi?	
IN	Sebab...MeP tu...dia ada..satu..element dimana macam gamification tu la...dia ada dia punye score dia..points dia....and then dia ada dia punye..content dia..bila kita tengok, oo kita tau benda ni dah update ke belum..benda ni belum update ke...	USABILITY
MAW	Adakah MARA ePortfolio itu senang digunakan?	
IN	Senang diguna..	USABILITY
MAW	Senang digunakan...Adakah anda menghadapi sebarang masalah apabila menggunakan MARA ePortfolio?	
IN	Aaa...ada satu. Dia macam...serabut sikit kadang-kadang..	USABILITY
MAW	Tak berapa tersusun lah? Content ke..?	
IN	Content dia tersusun, dia macam..bila orang bagi info macam...serabut...apa ni? Apa ni? Aa.. macam tu...	USABILITY
MAW	Maksudnya, terlampau banyak info? Ke..macam mana?	
IN	Terr..lampau banyak info..	USABILITY
MAW	Atau pun dari segi susunan ke?	
IN	Dari segi susunan...ok. Maybe sebab terlalu banyak info kot..yang di update dalam tu..	USABILITY
MAW	Terlalu banyak info...ok. Aktiviti apa yang anda selalu lakukan dalam MeP? Contoh macam...adakah anda membaca content..ataupun forum..ataupun upload something?	
IN	Aa..semua tu. Ada jugak tengok content dia...upload info..and saya ada melawat yang untuk blog tu...aa blogging tu...	USABILITY
MAW	So..ape pendapat anda tentang blogging tu?	
IN	Blogging tu...bagus la jugak. Boleh update info dalam tu...	USABILITY
MAW	Adakah anda update blog anda sendiri? Adakah anda ada create blog anda dalam MeP?	
IN	Aa..ada.	USABILITY
MAW	Ok..kalau diberi peluang, adakah anda akan kemaskini blog anda..dan apa maklumat yang anda akan share?	
IN	Macam knowledge, information..macam general knowledge semua tu..tak pun pasal course..mmm..	USABILITY
MAW	Ok..dalam MeP tersebut, laman apa yang anda kerap lawati?	
IN	Group.	USABILITY
MAW	Group..kenapa anda kerap lawat Group?	
IN	Sebab dekat Group tu...kalau ada info yang nak kena update...aa update kat situ...pastu tengok Group orang lain punye jugak..macam ada update punye info..	USABILITY
MAW	Ok..adakah anda merasakan interaksi dengan MeP somehow membuatkan anda prepare untuk satu-satu kelas	



Nama	Transkripsi	Kod
	atau satu-satu subjek?	
IN	Mmmm.....maksudnya macam mana tu?	
MAW	Dengan berinteraksi dengan MeP, adakah anda merasakan anda melakukan persediaan untuk satu-satu subjek atau satu-satu kelas?	
IN	Kalau dari segi...kelas...(terdiam dan berfikir)	USABILITY
MAW	Contoh, katakan anda berinteraksi dalam forum, adakah dengan interaksi dalam forum tu membuatkan anda rasa anda bersedia untuk masuk ke kelas bagi sesuatu subjek?	
IN	Ooo..kalau dah di update information tu...rasa bersedia laa...kalau dah diberitahu apa yang perlu dibuat ke ape...	USABILITY
MAW	Adakah dengan participation daripada pensyarah sendiri membuatkan anda rasa e-portfolio itu menarik?	
IN	Aa...iye.	USABILITY
MAW	Ok..ape perasaan anda untuk interaksi dalam e-portfolio tu, adakah e-portfolio menggalakkan anda mengubah behavior/your own behavior towards let say macam improve your visits...macam notifikasi tu dia menggalakkan anda...MeP ada bagi notifikasi dalam emel kan?	
IN	Ahaa...	USABILITY
MAW	Dengan notifikasi dalam profile..	
IN	Dekat tepi tu...	USABILITY
MAW	Apa pendapat anda tentang notifikasi ni?	
IN	Ia sangat bagus sebab dia bagitau kita..notification dia bagitau kita lah apa yang..apa yang dah diupdate semua..	USABILITY
MAW	Dari segi upload bahan-bahan pembelajaran, adakah anda rasa MeP itu membantu dan menggalakkan?	
IN	Haa..membantu dan menggalakkan.	USABILITY
MAW	Dari segi kemudahan untuk memberi feedback kepada rakan-rakan?	
IN	Membantu jugak.	USABILITY
MAW	Dari segi capaian kepada sumber-sumber elektronik? Contoh macam rakan-rakan upload dokumen atau artikel, adakah ia membantu?	
IN	Aha..membantu jugak.	USABILITY
MAW	Dari segi viewing more content, maksudnya adakah MeP menyediakan platform untuk anda view lebih content?	
IN	Ahaa..dia bagi view. Tak private dalam tu..so kita boleh view.	USABILITY
MAW	Dari segi publishing content?	
IN	Pun bagus jugak.	USABILITY
MAW	Update status?	
IN	Pun bagus jugak.	USABILITY
MAW	Menambah rakan-rakan?	
IN	Pun bagus jugak..(gelak kecil)	USABILITY
MAW	Dan last sekali forum..apa pendapat anda tentang forum?	
IN	Forum tu bagus...aa dari segi forum tu lah..dia macam ada...serabut dia sikit tu..sebab kadang-kadang orang update dekat status, kadang-kadang orang update dalam	USABILITY

Nama	Transkripsi	Kod
	group. Tapi kan, bahagian satu tempat tu...ada update status dengan forum. Haa.. yang tu kita confuse sikit.	
MAW	Ok..yang dekat Groups dengan Forum tu la...	
IN	Dia ada macam...homepage untuk Groups tu...	USABILITY
MAW	Ok..ok..so, soalan-soalan seterusnya berkaitan dengan game elements la...unsur-unsur gamification dalam MeP. Sebelum ini, adakah anda tahu apa itu unsur-unsur games? Ataupun, what is games element?	
IN	Tak berapa nak tau...	GE
MAW	Tak berapa tahu. So, sekarang ni tahu tak apa itu games element?	
IN	Tahu..	GE
MAW	So, apa itu games element?	
IN	Games element tu, yang ada...ala dia macam...yang ada untuk skor-skor tu laa...	GE
MAW	So, games element adalah..contohnya ciri-ciri games seperti mata ganjaran/points, badges, leaderboard dan banyak lagi lah...ok itu ialah games element. Pendapat anda tentang points, badges dan leaderboard dalam MeP, adakah ianya baik untuk anda ataupun untuk user?	
IN	Aa..dia baik untuk user.	GE
MAW	Kenapa anda katakana games element tu baik untuk user?	
IN	Sebab kat situ kita boleh tengok sampai mana tahap pencapaian kita.	GE
MAW	Apa yang anda rasa bila menerima points dan badges, bila anda browse content dalam MeP? Apa perasaan anda bila terima point?	
IN	Kat situ...dia rasa macam...lagi menggalakkan untuk mengguna..forum tu.	GE
MAW	Apa perasaan anda bila tengok nama anda dekat leaderboard tu?	
IN	Aa..perasaan tu..lagi menggalakkan lah. Dia lagi nak menggalakkan kita untuk guna.	GE
MAW	Apa perasaan anda apabila nama anda berada di top ten?	
IN	Lagi nak jadi top! (gelak)	GE
MAW	Apa perasaan anda bila tengok nama di lima terakhir?	
IN	Aa..itu..itu yang kita nak improve kan, untuk kita naik ke atas.	GE
MAW	Adakah anda setuju dengan adanya games element membuatkan anda bekerja lebih kuat untuk participate dalam e-portfolio system itu sendiri?	
IN	Aa..iye.	GE
MAW	Adakah anda setuju, games element tu menggalakkan anda melawat e-portfolio itu sendiri?	
IN	Aa..iye.	GE
MAW	Macam mana games element tu menggalakkan?	
IN	Dia bila kita lawat kemana-mana, dia akan diberi points. Lepas tu points tu akan ada notification untuk points tu.	GE

<b>Nama</b>	<b>Transkripsi</b>	<b>Kod</b>
MAW	Ok..untuk games element ni, adakah anda rasakan games element ni membuatkan anda rasa nak update status dengan lebih kerap?	
IN	Haa..iye.	GE
MAW	Adakah games element tu menggalakkan anda memberi komen kepada apa yang rakan anda letak di MeP?	
IN	Memberi komen?	
MAW	Ya.	
IN	Aa..iye.	GE
MAW	Let say macam rakan anda letak satu gambar, adakah games element menggalakkan anda memberi komen?	
IN	Aa..dia menggalakkan.	GE
MAW	Adakah anda setuju, somehow games element tu membuatkan anda rasa nak compete dengan rakan-rakan?	
IN	Aa..setuju.	GE
MAW	Adakah anda setuju, somehow games element tu dia influence anda untuk upload dengan share lebih learning evidences.	
IN	Setuju.	GE
MAW	Adakah anda merasakan sense of achievement bila menerima points dengan badges?	
IN	Haa..iye.	GE
MAW	Adakah dengan menerima points dengan badges tu..anda merasakan yang anda progressing?	
IN	Iye.	GE
MAW	Adakah points dengan badges tu membuatkan anda melakukan aktiviti yang anda takkan lakukan sekiranya takde points dengan badges?	
IN	Aa..apa dia?	
MAW	Adakah dengan adanya points dengan badges tu membuatkan anda melakukan aktiviti yang takkan anda lakukan kalau takde points dengan badges?	
IN	Aa..ye, ye..	GE
MAW	Contoh macam upload something..ataupun forum, kalau takde points, takde badges maksudnya kosong tanpa semua tu..adakah anda masih lakukannya?	
IN	Dia tak berapa sebanyak yang ada points tu lah..	GE
MAW	Overall impressions of games element dalam MeP means overall impressions of badges and leaderboard?	
IN	Ia sangat bagus	GE
MAW	Kenapa you rasa ia sangat bagus?	
IN	Sebab benda ni..kita akan tahu pencapaian kita. Lepas tu benda ni..menggalakkan and lagi mengimprovekan kita untuk..gunakan..aa dari segi education la..	GE
MAW	Sekiranya kita buat improvement pada kelemahan-kelemahan dalam sistem MeP ini, adakah anda akan menggunakannya pada masa hadapan untuk personal development?	
IN	Aa..iye, insha Allah..(senyum)	GE

<b>Nama</b>	<b>Transkripsi</b>	<b>Kod</b>
MAW	Kenapa agaknya?	
IN	Sebab kat situ...dia ada segala macam..dia punye data dia..dia punye information tu..dia update dalam tu..contoh macam notification, kita tau apa yang kita dah buat, apa yang kita belum buat..	GE
MAW	Pada pendapat anda, apakah ciri-ciri terbaik dan terburuk dalam aplikasi MeP?	
IN	Ciri terbaik..benda tu boleh upload banyak information, ada yang games element tu...semuanya ok lah dalam tu..kecuali satu je lah..yang satu ciri tu...dia agak serabut tu.	GE
MAW	Ada cadangan tak untuk improve aplikasi tersebut?	
IN	Untuk improve...mungkin kena asingkan bahagian update status dengan update dalam group.	GE
MAW	Lain-lain cadangan?	
IN	Tak ada.	
MAW	Ok...terima kasih..	
IN	Sama-sama..	

**Appendix G – Categoris, subcategories and codes for the perceptions  
of students about gamified e-portfolio (MeP)**

MeP	Content areas	Categories	Sub-categories	Examples of quotes used for coding	
1	Participant's background	Personal details	Name	'IN'	
			Course	'Diploma in English Communication'	
			Semester	'Semester 4'	
			Portfolio experiences	Paper-based portfolio experiences	'Aaa...ada. Yang biasa punya...dokumen biasa....Folder biasa...'
				e-portfolio experiences	'Aaa...ada. Dekat drive Google..'
			Computer games experiences	Like computer games	'Aa..suka.'
				Played educational games	'Aaa...biasa yang pasal vocabulary tu...'
				Feelings when playing computer games	'Aaaa....rasa macam...kalau yang ada...score semua tu...dia rasa competitive la...rasa macam addicted la....dengan permainan tu...'
			Gamification experiences	Have gamification experiences before using MeP	'Game elements...macam? Pernah..pernah...'
				Think gamification in education is ok	'Sesuai..Sebab aaa...kalau gamification ni...kalau yang ada...macam...score-score semua tu...itu akan membuatkan orang rasa...macam untuk compete laa...so, bila compete tu...dalam education akan buat diorang (pelajar) ada effort..aaa..'
			Sharing work	Like to share	'Aaa...su-suka jugak...Suka berkongsi...'
				Reasons to share or not to share	'Sebab...bila kita dah ada satu ilmu atau knowledge tu...so kita nak kongsi dengan orang lain supaya orang lain tahu jugak...ilmu dengan

MeP	Content areas	Categories	Sub-categories	Examples of quotes used for coding
				knowledge tu..'
		Comments for shared work	Like to receive comments and reasons	'Suka..(gelak kecil..). Sebab..kalau kita dah share dekat orang maklumat tu...so kita nak tahu sama ada diorang rasa maklumat tu betul ke... tak ke....so bila diorang ada komen...at the same time diorang akan ada questions untuk Tanya kat kita...so kita boleh jawab..Aaa...confirmation and clarification...'
			Like to give comments and reasons	'Aaa..kalau...rasa ada additional information..aa itu saya akan komen..untuk tam..tambahan maklumat..Aaa...sebab macam...kalau kita rasa diorang macam..diorang punye information tak cukup..so kita nak komen..kita nak bagi diorang lebih..tak pun nak memperbetulkan kalau diorang tersalah bagi information..Aaa..'
2	Usability	Usage	Frequency/recency	'Secara purata dalam seminggu...dalam sehari tu adalah 4-5 kali..'
			Duration	'Satu lawatan...20 ke 30 minit'
			Think time spent worth the visit or not	'Aa..berbaloi laa jugak. Sebab...MeP tu...dia ada..satu..element dimana macam gamification tu la...dia ada dia punye score dia..points dia....and then dia ada dia punye..content dia..bila kita tengok, oo kita tau benda ni dah update ke belum..benda ni belum update ke...'
		Ease of use	Easy to use	'Senang diguna..'

MeP	Content areas	Categories	Sub-categories	Examples of quotes used for coding
			Any difficulties	'Aaa...ada satu. Dia macam...serabut sikit kadang-kadang.. Content dia tersusun, dia macam..bila orang bagi info macam...serabut...apa ni? Apa ni? Aa.. macam tu... Terr..lampau banyak info.. Dari segi susunan...ok. Maybe sebab terlalu banyak info kot..yang di update dalam tu..'
		Activities	Types of activities	'Aa..semua tu. Ada jugak tengok content dia...upload info..and saya ada melawat yang untuk blog tu...aa blogging tu... Blogging tu...bagus la jugak. Boleh update info dalam tu... Aa..ada. Macam knowledge, information..macam general knowledge semua tu..tak pun pasal course..mmm..'
		Page visited	Members	
			User groups	'Group. Sebab dekat Group tu...kalau ada info yang nak kena update...aa update kat situ...pastu tengok Group orang lain punye jugak..macam ada update punye info..'
			Members activity	
			e-portfolio	
			Coursework	
			Forums	
			MyProfile	
		Interactions	Relationship with class preparation	'Kalau dari segi...kelas...(terdiam dan berfikir). Ooo..kalau dah di update information tu...rasa bersedia laa...kalau dah diberitahu apa yang perlu dibuat ke

MeP	Content areas	Categories	Sub-categories	Examples of quotes used for coding
				ape..'
			Relationship with user behavior	'Ahaa... Dekat tepi tu...(notifikasi) la sangat bagus sebab dia bagitau kita..notification dia bagitau kita lah apa yang..apa yang dah diupdate semua.. Haa..membantu dan menggalakkan (Dari segi upload bahan-bahan pembelajaran).'
3	Games element	Understanding	Define games element	'Tak berapa nak tau...(sebelum ini). Tahu...(sekarang). Games element tu, yang ada...ala dia macam...yang ada untuk skor-skor tu laa...
		Opinion	Points, badges, leaderboard	'Aa..dia baik untuk user. Sebab kat situ kita boleh tengok sampai mana tahap pencapaian kita.'
		Feelings	Points, badges, leaderboard	'Kat situ...dia rasa macam...lagi menggalakkan untuk mengguna..forum tu. Aa..perasaan tu..lagi menggalakkan lah. Dia lagi nak menggalakkan kita untuk guna. Lagi nak jadi top! (gelak). Aa..itu..itu yang kita nak improve kan, untuk kita naik ke atas.
		Effects	Visit frequency/recency	'Aa..iye (games element membuatkan anda bekerja lebih kuat untuk participate dalam e-portfolio system itu sendiri).
			Motivation	'Aa..iye. (games element tu menggalakkan anda melawat e-portfolio itu sendiri). Dia bila kita lawat kemana-mana, dia akan diberi points. Lepas tu points tu akan ada notification untuk points



MeP	Content areas	Categories	Sub-categories	Examples of quotes used for coding
				tu. Haa..iye (games element ni membuatkan anda rasa nak update status dengan lebih kerap).’
		Overall perceptions	Best/good aspects	‘la sangat bagus. Sebab benda ni..kita akan tahu pencapaian kita. Lepas tu benda ni..menganjurkan and lagi mengimprovekan kita untuk..gunakan..aa dari segi education la.. Ciri terbaik..benda tu boleh upload banyak information, ada yang games element tu...semuanya ok lah dalam tu..’
			Worst/bad aspects	‘kecuali satu je lah..yang satu ciri tu...dia agak serabut tu.’
			Suggestions/potential use	‘Tak ada.’
4	Social elements	Awareness Opinion	Aware(use) of the features Blog, group, forum	‘ya, saya tahu adanya blog dan forum dan saya menggunakannya’
5	Ownership and control	Opinion	Power to create and manage content Motivation	‘saya boleh letak (bahan) apa yang saya nak dan buang mana yang tak perlu....saya jadi suka untuk kemaskini dan ubah bahan dalam e-portfolio saya terutama bila kawan-kawan bagi maklumbalas’

**Appendix H – Data coding sheet for content analysis of participant’s  
background of MeP**

No	Participant's name	Course	Gender	Like to play computer games	Have a portfolio before MeP	Think MeP usable	Think game elements is good	Will use MeP for personal development
1	Student01	DEC	F	Y	Y (common documents, folder)	Y (worth it, easy to use)	Y	Y
2	Student02	DEC	F	Y	Y (paper-based)	N (not enough help features)	Y	Y (if there is improvement to MeP)
3	Student03	DEC	F	Y	Y (computer-based)	N (need to familiarize first because so used to facebook application )	Y	Y
4	Student04	DEC	F	Y (but depends on the games)	N (MeP is the first)	Y (find it difficult at first but said it is easy to use afterwards)	Y	Y

## Appendix I – Consent Form

### Consent Form

*Biomedical and Scientific Research Ethics Committee Study Number:* BSREC  
REGO-2014-916

*Title of Project:* Raising engagement and motivation through Gamified E-Portfolio

*Names of Researchers:* Monisa Abdul Wahab and Dr Mike Joy

Please initial all boxes

- I confirm that I have read and understand the information sheet dated 1 July 2014 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my education or legal rights being affected.
- I agree to take part in the above study.

Name of Participant .....

Date .....

Signature .....

Name of Person taking consent .....

Date .....

Signature .....

## Appendix J – Pilot Test

The questions below are for pilot test of MARA ePortfolio (MeP) system.

Please fill in your details. We will keep your response anonymous.

Name	
Age	
Department	
Gender	

### Instructions:

1. First, you have to go to <http://www.learn2mep.com> and register for an account.
2. Second, upon receiving confirmation email, login using your username and password and try to explore the website.
3. Third, try to do as many activities as you can in the MARA ePortfolio (MeP) system and keep an eye of your accumulating points, badges, and see your rank in the leaderboard.
4. Answer the following questions.

### Pilot test questions

<b>Q1</b>	<b>What do you feel about getting points for browsing the e-portfolio content?</b>
A1	

<b>Q2</b>	<b>Do you think points, badges, and leaderboard is good for you? Why?</b>
A2	

<b>Q3</b>	<b>Do the game elements make you work harder to participate within the e-portfolio system?</b>
A3	

<b>Q4</b>	<b>Do you agree that somehow the game elements make you want to compete with your friends in the e-portfolio system?</b>
A4	

<b>Q5</b>	<b>Do the game elements encourage you to visit the e-portfolio more often?</b>
A5	

<b>Q6</b>	<b>How do the game elements encourage you to visit the e-portfolio system?</b>
A6	

<b>Q7</b>	<b>Do the game elements make you update your e-portfolio frequently?</b>
A7	

<b>Q8</b>	<b>Do you agree that points, badges, and leaderboard somehow influence you to upload and share more artifacts (learning evidences) in the e-portfolio system?</b>
A8	

<b>Q9</b>	<b>Do the game elements encourage you to give comments to other member's artifacts?</b>
A9	

<b>Q10</b>	<b>Do you like to receive comments of your shared artifacts? Why?</b>
A10	

<b>Q11</b>	<b>Do you like to give comments to other member's artifacts? Why?</b>
A11	

<b>Q12</b>	<b>What do you feel when you receive a point/badge?</b>
A12	

<b>Q13</b>	<b>Do you feel a sense of achievements when you receive points and/or badges?</b>
A13	

<b>Q14</b>	<b>Does points and badges make you work hard to update your e-portfolio and participate more?</b>
A14	

<b>Q15</b>	<b>Do points and badges make you do a task which you may not be doing without it (e.g. update your profile? Why?</b>
A15	

<b>Q16</b>	<b>Do you think your current points and earned badges shows that you are progressing?</b>
A16	

<b>Q17</b>	<b>Do you like to receive points, badges, and see your leaderboard? Why?</b>
A17	

<b>Q18</b>	<b>What is your overall impressions of the game elements included?</b>
A18	

<b>Q19</b>	<b>Do you feel gamification (including game elements in a non-games application/task) is appropriate within education?</b>
A19	

<b>Q20</b>	<b>Will you use MARA ePortfolio to plan your personal development?</b>
A20	

**By answering these questions, you are giving consent to participate in the pilot test. We will assure that your information will be kept confidential. Thank you for your time and cooperation.**

## Appendix K – Warwick survey participants’ demographic

Characteristics	Count (n=34)	Percentage, %
<b>Department</b>		
Computer Science	12	35.3%
Centre for Education Studies (CES)	7	20.6%
WMG	2	5.9%
Centre for Applied Linguistics (CAL)	2	5.9%
Chemistry	1	2.9%
Health Science	1	2.9%
Maths	1	2.9%
Physics	1	2.9%
Psychology	1	2.9%
School of Law	1	2.9%
Theatre & Performance Studies	1	2.9%
Theatre Studies	1	2.9%
Warwick Medical School (WMS)	2	5.9%
Warwick Business School (WBS)	1	2.9%
<b>Degree title</b>		
PhD in Computer Science	8	23.6%
PhD in Education	4	11.8%
PhD in Health Sciences	2	5.9%
Applied Linguistics	1	2.9%
Computer Science	2	5.9%
Chemistry	1	2.9%
Degree in Accounting and Finance	1	2.9%
Education	2	5.9%
Information Technology	1	2.9%
Master in Mathematics	1	2.9%
PhD Engineering	1	2.9%
PhD in Arts Education	1	2.9%
PhD in English	1	2.9%
PhD in Law	1	2.9%
PhD in Nursing	1	2.9%
PhD in Physics	1	2.9%
PhD in Theatre Studies	1	2.9%
PhD in Applied Linguistics	1	2.9%

<b>Characteristics</b>	<b>Count (n=34)</b>	<b>Percentage, %</b>
PhD	1	2.9%
Degree	1	2.9%
MPhil	1	2.9%
<b>Degree level</b>		
PhD's Degree	29	85.3%
Master's Degree	3	8.8%
Bachelor's Degree	2	5.9%
<b>Year of study</b>		
1 <sup>st</sup>	4	11.8%
2nd	8	23.6%
3rd	11	32.4%
4th	10	29.4%
5th	1	2.9%
<b>Institution</b>		
University of Warwick	34	100%
<b>Previous country of study</b>		
Malaysia	19	55.9%
Australia	2	5.9%
Bosnia and Herzegovina	1	2.9%
Jordan	1	2.9%
China	1	2.9%
Malaysia & UK	1	2.9%
N/A	2	5.9%
Nigeria	1	2.9%
Saudi Arabia	1	2.9%
Thailand	1	2.9%
UK	3	8.8%
UK & Nigeria	1	2.9%
<b>Nationality</b>		
Malaysian	22	64.7%
Saudi Arabia	3	8.8%
Bosnian	1	2.9%
British	1	2.9%
Dutch	1	2.9%



<b>Characteristics</b>	<b>Count (n=34)</b>	<b>Percentage, %</b>
Jordanian	1	2.9%
Nigerian	3	8.8%
Singaporean	1	2.9%
Thai	1	2.9%
<b>Gender</b>		
Female	24	70.6%
Male	10	29.4%
<b>Age</b>		
20	3	8.8%
26	1	2.9%
29	2	5.9%
30	3	8.8%
31	4	11.8%
32	4	11.8%
33	1	2.9%
34	1	2.9%
36	2	5.9%
37	1	2.9%
30+	1	2.9%
40	1	2.9%
41	3	8.8%
42	1	2.9%
47	1	2.9%
N/A	5	14.7%

## Appendix L – Research Timeline

No.	Activities	Duration
1.	Draft a research proposal	June 2013 (1 <sup>st</sup> month) - July 2013 (2 <sup>nd</sup> month)
2.	Prepare preliminary investigation on e-portfolio in higher education	June 2013 (1 <sup>st</sup> month) - October 2013 (5 <sup>th</sup> month)
3.	Compare and evaluate referencing techniques and tools	September 2013 (4 <sup>th</sup> month) - November 2013 (6 <sup>th</sup> month)
4.	Select suitable referencing tools and software	October 2013 (5 <sup>th</sup> month) - November 2013 (6 <sup>th</sup> month)
5.	Draft a literature review	December 2013 (7 <sup>th</sup> month) - May 2014 (12 <sup>th</sup> month)
6.	Prepare research methodology document	December 2013 (7 <sup>th</sup> month) - May 2014 (12 <sup>th</sup> month)
7.	Identify research gap(s)	January 2014 (8 <sup>th</sup> month) - March 2014 (10 <sup>th</sup> month)
8.	Prepare research questions	March 2014 (10 <sup>th</sup> month) - May 2014 (12 <sup>th</sup> month)
9.	Prepare data collection plan and data analysis techniques documents <ul style="list-style-type: none"> <li>- Draft of questionnaires</li> <li>- Ethical consent approval</li> </ul>	March 2014 (10 <sup>th</sup> month) - May 2014 (12 <sup>th</sup> month)
10.	<b><i>Prepare year 1 report and annual review/viva upgrade</i></b>	<b><i>March 2014 (10<sup>th</sup> month) - May 2014 (12<sup>th</sup> month)</i></b>
11.	Apply MARA and individual colleges ethical consent approval	June 2014 (13 <sup>th</sup> month) - August 2014 (15 <sup>th</sup> month)
12.	Do online pre-survey data collections	September 2014 (16 <sup>th</sup> month) - October 2014 (17 <sup>th</sup> month)
13.	Do pre-survey data analysis	November 2014 (18 <sup>th</sup> month) - January 2015 (20 <sup>th</sup> month)
14.	Prepare MARA ePortfolio (MeP) system requirements planning	November 2014 (18 <sup>th</sup> month) - January 2015 (20 <sup>th</sup> month)
15.	Draft pre-survey report	February 2015 (21 <sup>st</sup> month) - March 2015 (22 <sup>nd</sup> month)
16.	Prepare MeP software requirements analysis document	February 2015 (21 <sup>st</sup> month) - March 2015 (22 <sup>nd</sup> month)

No.	Activities	Duration
17.	Design and develop MeP prototype	March 2015 (22 <sup>nd</sup> month) - October 2015 (29th month)
18.	<b>Prepare year 2 report and 2<sup>nd</sup> annual review</b>	<b>April 2015 (23<sup>rd</sup> month) - May 2015 (24th month)</b>
19.	Do MeP prototype pilot testing	November 2015 (30 <sup>th</sup> month) - January 2016 (31st month)
20.	Improve MeP prototype	January 2016 (31 <sup>st</sup> month) - January 2016 (31st month)
21.	Implement MeP prototype	February 2016 (32 <sup>nd</sup> month) - April 2016(34th month)
22.	Evaluate MeP prototype and collect feedback (interview and online survey)	April 2016 (34 <sup>th</sup> month) - May 2016 (35th month)
23.	<b>Prepare year 3 report and annual review</b>	<b>April 2016 (34<sup>th</sup> month) - May 2016 (35th month)</b>
24.	Data analysis: interview	May 2016 (35 <sup>th</sup> month) - June 2016 (36th month)
25.	Data analysis: online survey	May 2016 (35 <sup>rd</sup> month) - August 2016 (38th month)
26.	Data analysis: sample portfolios	May 2016 (35 <sup>th</sup> month) - September 2016 (39th month)
27.	Produce post survey and interview data analysis report	September 2016 (39 <sup>th</sup> month) - October 2016 (40th month)
28.	Conduct Warwick mini-survey	September 2016 (39 <sup>th</sup> month) – November 2016 (41 <sup>st</sup> month)
29.	Data analysis for Warwick mini-survey	December 2016 (42 <sup>nd</sup> month) – January 2017 (43 <sup>rd</sup> month)
30.	Writing theses outcomes	November 2016 (41 <sup>st</sup> month) - February 2017 (42nd month)
31.	<b>Prepare year 4 final report and final viva</b>	<b>February 2017 (42<sup>nd</sup> month) - May 2017 (45th month)</b>