Technology Acceptance of Healthcare E-Learning Modules: A Study of Korean and Malaysian Students' Perceptions

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ABSTRACT
Educators today are moving towards transforming their teaching and learning methods from conventional teacher-centered approaches to student-centered learning approaches with the support of technology so as to better motivate students to participate and engage in their learning process. This study was developed as a joint collaborative effort between Inje University, South Korea, and Multimedia University, Malaysia, in order to investigate Korean and Malaysian students' perceptions of an e-learning web module about health rooms in Korea. An e-learning web module was developed using Mayer's (2001) Principles of Multimedia Learning and presented to Korean and Malaysian students. A Technology Acceptance Model (TAM) survey was developed to measure their perceptions of this e-learning website. Results show that students were positive in the Perceived Usefulness (PU) and Perceived Ease-of-Use (PEOU) constructs which in turn resulted in positive Attitudes towards Usage (ATU) and Behavioral Intentions to Use (BIU) constructs in the application. The results thus show positive technology acceptance of the e-learning health room web module and provide positive encouragement for educators to develop interactive healthcare modules for e-learning.

INTRODUCTION
Educators today are moving towards transforming their teaching and learning methods from conventional teacher-centered approaches to student-centered learning approaches with the support of technology so as to better motivate students to participate and engage in their learning process. ICT has been shown to be an enabler that provides educators with flexibility and creativity, and its rapid growth has become a driving force for educators to innovate and enhance their teaching and learning methodologies, and, consequently, progress towards higher engagement levels of their students (Vallance, 2008; Lee, Yoon & Lee, 2009; Park, 2009; Sivapalan & Wan Fatimah, 2010). Consistent with this is the challenge from today's students, coined "digital natives" by Prensky (2001), who are technology-savvy and expect to have some form of technology-supported curriculum in their learning process. As such, McLoughlin and Lee (2010) have suggested that the education landscape evolve to accommodate such changes and take advantage of their benefits for teaching and learning on a global scale (Laurillard, 2013). Research has also shown that these technological advancements directly influence the way educational content is now being taught, bringing about changes in the roles of student and teachers in the classrooms (Mahajan, 2012), and making learning more meaningful (Dembo & Seli, 2012).

A popular method of using technology-supported teaching, or e-learning, involves providing students with online access to their learning materials. Educators are transforming their curricula into e-learning materials that involve multimedia elements and interactivity, uploading them onto an online system that would allow students to have access to them outside of classrooms (Palloff and Pratt, 2013), and allowing educators to "*tap the power of visual and verbal forms of expression in the service of promoting student understanding*" (Mayer, 2003). Such a learning environment is deemed to be student-centred as students are empowered with the control and activity of these online modules. In such a learning environment, students are active in their learning process and

are involved in acquiring and navigating through the content in the learning modules at their own pace (Svensson & Ostlund, 2007).

South Korea and Malaysia are two of the countries in Asia that have sought to follow in the global educational trend towards innovating curricula and adopt more technology-supported classrooms. The rapid growth of ICT in South Korea has had significant impact on the development of e-learning (Misko, Choi, Hong & Lee, 2005; Kim & Santiago, 2005; Park, 2009), and the "Law for Developing On-Line Digital Contents Industry" was legislated by the South Korean Government for universities to develop digital content and produce more IT graduates for their IT companies (Lee et. al, 2009). In Malaysia, the 'Blueprint on Enculturation of Life-Long Learning for Malaysia 2011-2020' by the Malaysian Ministry of Higher Education (MOHE, 2011), advocates the need to incorporate creativity and innovation into the education system in order to empower 21st century graduates and to embed student-centred learning approaches into the design of their classes. As such, institutions of higher learning in Malaysian are beginning to incorporate ICT materials in developing e-learning methods and in web-based courses (Hong, Abang Ekhsan & Zaimuarifuddin, 2005; Suraya, 2005; Yap, Neo & Neo, 2013).

However, despite the move towards e-learning and technology-supported classrooms, there is still little research on the acceptance of such systems and how they affect the quality of learning among the students' learning process (Lee, 2006, Liaw, 2008; Lee et. al, 2009; Liu, Liaw & Pratt, 2009; Leem & Lim, 2007; Park, 2009). In addition, educators still lack confidence in their e-learning developments and proper pedagogical frameworks for designing effective e-learning and student-centred materials are still needed (Chung, 2008; Martin & Klein, 2008), Therefore, this research study seeks to investigate Korean and Malaysian students' perceptions of e-learning modules and provide insights for Korean and Malaysian educators to design effective e-learning applications. Mayer's (2001) Principle of Multimedia Learning was employed as the theoretical framework to designing and developing the module, and the Technology Acceptance Model (TAM) was used to measure students' attitudes and perceptions towards such a learning environment. As such, this study proposes to answer the research question, "What are the perceptions and attitudes of Korean and Malaysian students towards an interactive e-learning web module?"

STUDENT-CENTRED E-LEARNING ENVIRONMENTS

Limitations of conventional teaching methods have led to more student-centred learning approaches being incorporated into the teaching and learning methodologies. Defined as the learning process in which the focus in on the students and their control over the pace and content of their learning materials (Griffiths, Oates & Lockyer, 2007; Baeten, Kyndt, Struyven & Dochy, 2010). The American Psychological Association Board of Educational Affairs lists four categories of principles that define student-centred environments (Alfassi, 2004):

1. Cognitive and metacognitive factors, where the learning process is constructed so that learners become aware of their thinking and learning
2. Motivation and affective factors, which relate to the interest of the students in their learning process
3. Developmental and social factors, where a positive learning climate and relationship is established and facilitates meaningful learning among learners and teachers
4. Individual differences where the learning mode accommodates the different learning capabilities of the learner

As a result, many learning environments today are moving towards student-centred learning approaches that put students at the centre of the learning process. In these environments, students are active participants in their learning process, with more alternatives in identifying the learning goal, obtaining necessary resources, and making some decisions in the learning process, rather than just passively receiving what was given or be controlled by the teachers (Griffiths, Oates & Lockyer, 2007). By having the strategy of giving students more control and interactions, their interests and motivation levels would be enhanced. In addition, when hypermedia and interactive contents are used, the learning setting is broadened and students' learning experiences are enriched (Alessi & Trollip, 2001). And with the incorporation of media elements, the pedagogical strength in engaging student learning is improved, and learning is enlivened as it adds richness and meaning to the information presentation through the use of more than one medium (Ma, O'Toole & Keppell, 2008). Subsequently, the web has provided educators with a platform for disseminating their interactive course materials asynchronously to students outside of the physical classroom walls. With the advent of e-learning as an innovative method of teaching, educators are provided with more flexibility in creating exciting learning environments.

THE TECHNOLOGY ACCEPTANCE MODEL (TAM)

Many e-learning materials have been developed to address the issue of creating technology-supported classrooms that would be accessible to students asynchronously. However, the lack of confidence and

pedagogical support, as mentioned above, results in a discrepancy in the effectiveness of such applications. Moreover, as students become more technologically-savvy (Prensky, 2001), it is thus important to assess their acceptance of the many e-learning applications presented to them. The Technology Acceptance Model (TAM) has been a proven model to capture the key determinants of students' intentions to use a particular application (Schroff, Deneen & Ng, 2011).

The technology acceptance model (TAM) was developed by Davis (1989) to explain how students would accept and use a certain technology. According to this theory, there are a number of key factors that would determine whether or not a student would use the technology:

1. Perceived Usefulness (PU), whereby a student would use the technology if s/he perceived it to be useful to them
2. Perceived Ease-of-Use (PEOU), whereby a student would use the technology is s/he perceived it to be easy to use and without much effort
3. Attitudes towards usage (ATU), which represents how a student feels about the technology

According to the model, PU and PEOU are the cognitive factors that the student experiences, while ATU is the positive or negative evaluative effect that the student will have when considering using a particular application, and will ultimately guide him or her to use that application. External variables such as the content of the application, how the user navigates around the system, and features of the application are also deemed to influence students' PU and PEOU (Cyr, Head & Larios, 2010; Gaines & Curry, 2011; Schroff et. al, 2011). Consequently, the model further posits that these characteristics would have significant influences on the student's behavioural intention to use (BIU) the technology (Davis, 1989; Ajzen & Fishbein, 2000; McKinnon & Igonor, 2008; Schroff et. al, 2011). Figure 1 shows the conceptual representation of TAM as developed by Davis, Bagozzi & Warshaw (1989).

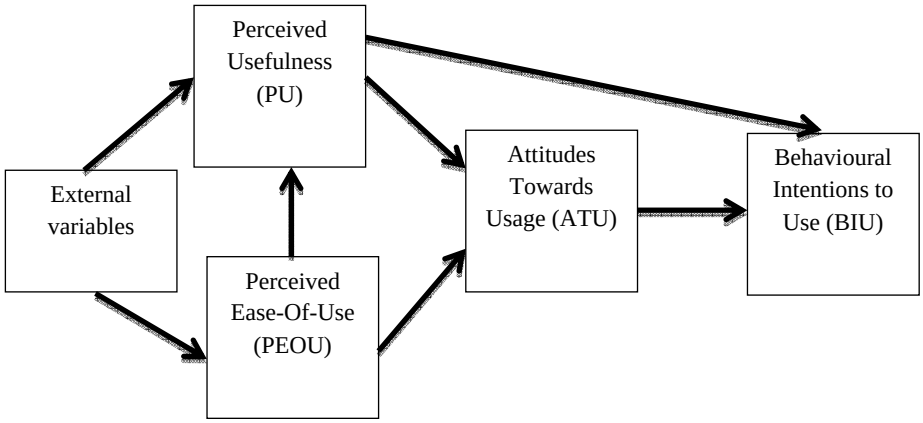

Figure 1 The TAM (Davis et.al, 1989)

In this study, the TAM illustrated in Figure 1 was adapted and used to investigate technology acceptance of an e-learning healthcare module amongst Korean and Malaysian students.

METHODOLOGY: DESIGNING THE E-LEARNING ENVIRONMENT

The study was a collaborative research effort between Inje University's School of Design, South Korea, and Multimedia University's Faculty of Creative Multimedia, Malaysia, to investigate both Korean and Malaysia students' perceptions and attitudes towards e-learning environments. The study was funded by South Korea's BK21 Plus Healthcare USD Design Research Group in Inje University, which looks into designing proper healthcare environments for Korean and international societies. One of the initiatives was to investigate the acceptance of health rooms in Korean schools, based on their designs such as colour, furniture, location, etc. As such, schools with enrolment rates of 300 and above were selected by the Korean Government to create appealing health rooms, as part of the Korean Government's Health Room Modernization Service initiative. As such, content for the web module was obtained from 10 Korean health rooms located in Busan city, South Korea. Images were taken to show the interior and exterior of these health rooms, the furniture, colour, and individual rooms in each health rooms. All health rooms in the sample had images of these areas to maintain consistency in the presentation of the visuals in the module.

The web module was developed incorporating Mayer's (2001, 2003) principles of multimedia learning and cognitive load. According to Mayer's (2003) cognitive theory of multimedia learning, incorporating multimedia elements into a learning module must be considered in the design of the application, as well as the impact of its interactivity and feedback on student learning, and that the combination of various media elements contribute to determining learners' educational effectiveness, and is critical to the success to having a positive impact in multimedia learning, as it puts the learner in control. The seven principles are Multimedia Principle, Spatial Contiguity Principle, Temporal Contiguity Principle, Coherence Principle, Modality Principle, Redundancy Principle, and Individual Differences Principle and are listed in Table 1 below (Mayer, 2001):

Table 1 Mayer's 7 Principles of Multimedia Learning

	Design Principle	Principle's Explanation
1.	Multimedia Principle	Use text and graphics together to enhance learning experience.
2.	Spatial Contiguity Principle	Arrange related text and graphics close to each other on the screen to enhance learning.
3.	Temporal Contiguity Principle	Have the related text and graphics to appear at the same time on the screen to enhance learning.
4.	Coherence Principle	Irrelevant or additional text, graphics, and audio are not included on the screen.
5.	Modality Principle	The combination of animation and narration will enhance students' learning.
6.	Redundancy Principle	Text shall not be included when animation and narration are presented on the screen.
7.	Individual Differences Principle	Students who are new learners for the module and high-spatial learners would have better learning effect from the design.

These principles were incorporated into the web module to create the web module. The modules were presented in both Korean and English languages, whereby Koreans students would access the Korean site, and Malaysian students would access the English site. However, both languages were available at all times, for students to explore. Figure 2 shows the introduction page, which utilises Mayer's Multimedia Principle of using text and graphics together.

Figure 2 The introduction page with Korean and English language options and an graphical image

Figure 3 shows an example of Mayer's Spatial Principle in the module. As can be seen in Figure 3, graphics and text are placed next to each other in order to support the message of the image. This fundamental principle allows students to process both visually and textually the same content, thus creating an enhanced learning experience for them and to enable a more effective processing of the information onscreen.

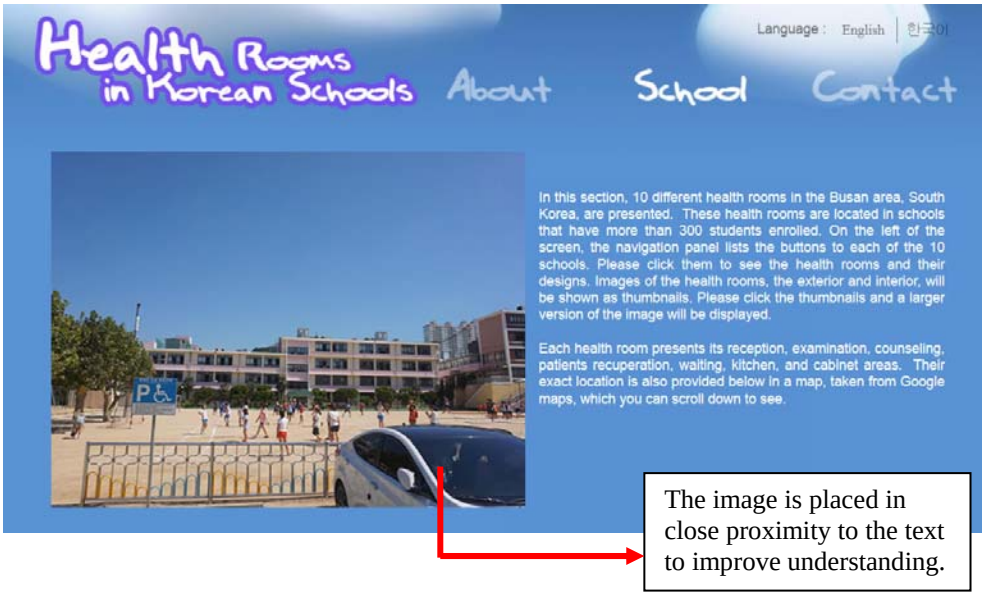

Figure 3 Mayer's Spatial Contiguity Principle (Text and graphics are placed close to each other to create a more effective learning process).

Mayer's (2001) Temporal Contiguity Principle states that text and graphics should be presented at the same time to facilitate a better learning process. In Figure 4, each of the school's images appears when the user clicks any of the thumbnails. Textual explanations and descriptions of each of the images appear at bottom of each image at the same time. That way, learners will be able to focus on the information presented, and not experience any cognitive overload.

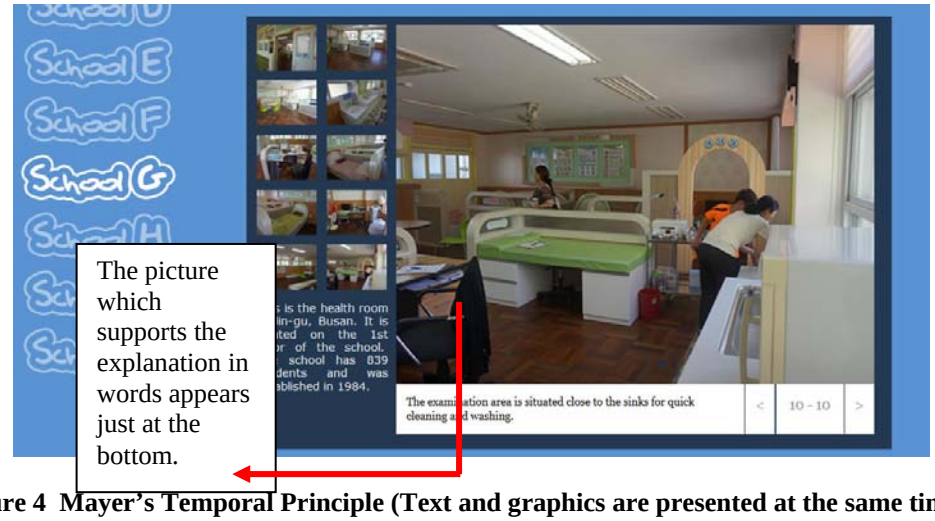

Figure 4 Mayer's Temporal Principle (Text and graphics are presented at the same time).

The module also incorporated Mayer's (2001) Coherence Principle, whereby irrelevant text or graphics were not included in the module. Since the module would be an e-learning and informative module, extraneous information would only heighten the confusion and comprehension of the content. Therefore, information that related to the images in the schools were presented. However, in order to improve the presentation of the content, a live map of each of the schools was embedded into the pages. These maps were obtained from Google Maps and were embedded so that learners would be able to visualise the location of the schools in real-time. In addition, using live Google Maps would not only show the locations of these schools, but learners could also see street views of the schools. This would narrow any distance issues for learners who do not reside in Korea or near the areas of the schools, and thus, be an effective tool to enhance the learning of the content. Figure 5 shows the image of the schools with Google Maps embedded.

Figure 5 Mayer's Coherence Principle (only relevant text and graphics are embedded).

This module was uploaded into the university server and accessible 24/7. A mixed-method research design was used in this research, using both quantitative and qualitative data collection instruments. A survey questionnaire was designed to measure students' attitudes and perceptions toward the module. The questionnaire adapted the Technology Acceptance Model by Davis (1989) to gauge learners' Intentions to Use (IU) the module. According to Davis (1989), the Technology Acceptance Model (TAM) was designed to measure learners' BIU based on their Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), which would influence their Attitudes Towards Usage (ATU) and Behavioral Intentions to Use (BIU), as previously shown in Figure 1. The questionnaire also contained open-ended items to solicit student comments and feedback on the module.

The items on the questionnaire were designed to gauge 3 constructs which would measure students' perceived usefulness (PU) and perceived ease of use (PEOU), which were: 1) Content, 2) Visual Appeal and 3) Navigation. Content and Visual Appeal constructs would generate results for students' Perceived Use (PU) and the Navigation construct would generate results for students' Perceived Ease of Use (PEOU).

A total of 133 students participated in the study. Subjects were undergraduate students from the School of Design, Inje University, and the Faculty of Creative Multimedia, Multimedia University. There were 67 Korean undergraduates and 66 Malaysian undergraduates who participated. The questionnaires were translated in Korean (for the Korean students) and verified by language experts in the faculty, to maintain the integrity of the items asked.

ANALYSIS AND RESULTS

A multi-item Likert scale questionnaire was created to gauge students' perceptions on the usefulness and ease of use of the module, and were designed using research constructs from the literature. The questionnaire scale ranged from 5 = Strongly Like, 4 = Like, 3 = Undecided, 2 = Dislike, and 1 = Strongly Dislike. Students were presented this module in a computer laboratory setting, so every student could view it from his or her computer. They were given 30 minutes to view the module and complete the survey questionnaire. The data were analysed using SPSS 16 and cross-tabulations of the data shows the breakdown of students by nationality and gender. Table 2 presents these results.

Table 2 Crosstabulations of students by gender and nationality

		Nationality		
		Korean	Malaysian	Total
female	Count	46	33	79
	% within Student's gender	58.2%	41.8%	100.0%
	% within Korean or Malaysian	68.7%	50.0%	59.4%
	% of Total	34.6%	24.8%	59.4%
male	Count	21	33	54
	% within Student's gender	38.9%	61.1%	100.0%
	% within Korean or Malaysian	31.3%	50.0%	40.6%
	% of Total	15.8%	24.8%	40.6%
Total	Count	67	66	133
	% within Student's gender	50.4%	49.6%	100.0%
	% within Korean or Malaysian	100.0%	100.0%	100.0%
	% of Total	50.4%	49.6%	100.0%

As can be seen in Table 1, there is an even percentage of Malaysian males and females in the sample, but Korean females make up the majority of the Korean sample data (68.7% Korean females, Korean 31.3% males). There were also more females than males in the sample (59.4% females, 40.6% males). Analysis of the questionnaire yielded a Cronbach Alpha coefficient of 0.915, which clearly showed that the survey was reliable (Lim, Khine, Hew, Wong, Shanti & Lim, 2003). Further analysis of the data showed that students were positive towards the e-learning module and results are presented in Table 3.

Table 3 Means and percentage of favourable answers (ranked) from the survey questionnaire

Items on survey questionnaire	**Mean**	**Std. Deviation**	**%**
1. Understanding of content	4.02	.793	80.5
2. Ease of navigation	4.02	.853	78.2
3. Ease of buttons and links to navigate	3.99	.754	82.0
4. Increased understanding of Korean Health rooms	3.90	.787	74.4
5. Suitability of furniture for health rooms	3.90	.852	75.9
6. Instructions were easy to understand	3.90	.852	73.7
7. Suitability of colours of the health rooms	3.86	.760	72.9
8. Liked the colours of the rooms	3.77	.966	66.9
9. Informative and useful website	3.72	.742	64.7
10. Important information were easy to find	3.65	.826	58.6
11. Just the right amount of information on screen	3.65	.817	60.9
12. Motivated to learn more	3.64	.873	54.1
13. Interface was appealing	3.62	.877	57.1
14. Liked interaction with website	3.62	.832	60.9
15. Enjoyed learning from the website	3.58	.955	54.9
16. Liked learning about health rooms in Korea	3.56	.762	57.1
17. Found website interesting	3.53	.926	53.4
18. Graphics made content easy to understand	3.53	1.049	54.9
N= 133			

In terms of the technology acceptance model, the survey developed measured three constructs: 1) Content, 2) Visual Appeal, and 3) Interactivity and Navigation. As mentioned earlier, Content and Visual Appeal constructs

would generate results for students' Perceived Use (PU) and the Navigation construct would generate results for students' Perceived Ease of Use (PEOU). Table 4 presents the items mapped to the TAM.

Table 4 Items on the survey that correspond to students' PU and PEOU

Items on survey	TAM
Content	Perceived Usefulness (PU)
Understanding of content	
Increased understanding of Korean Health rooms	
Informative and useful website	
Just the right amount of information on screen	
Found website interesting	
Visual Appeal	Perceived Usefulness (PU)
Suitability of furniture for health rooms	
Suitability of colours of the health rooms	
Liked the colours of the rooms	
Motivated to learn more	
Interface was appealing	
Enjoyed learning from the website	
Liked learning about health rooms in Korea	
Interactivity and navigation	Perceived Ease-Of-Use (PEOU)
Ease of navigation	
Ease of buttons and links to navigate	
Instructions were easy to understand	
Important information were easy to find	
Liked interaction with website	
Graphics made content easy to understand	

The survey can be further broken down to show Korean and Malaysian students' perceptions, as shown in Table 5 and 6 below.

Table 5 Top 10 highest ranked means for the Korean sample

Items on survey questionnaire	Mean	Std. Deviation	%
1. Ease of buttons and links to navigate (PEOU)	4.03	.674	88.1
2. Understanding of content (PU)	4.00	.758	79.1
3. Suitability of furniture for health rooms (PU)	3.97	.758	79.1
4. Ease of navigation (PEOU)	3.94	.776	70.1
5. Increased understanding of Korean Health rooms (PU)	3.85	.764	71.6
6. Suitability of colours of the health rooms (PU)	3.84	.687	62.7
7. Instructions were easy to understand (PEOU)	3.82	.869	68.7
8. Liked learning about health rooms in Korea (PU)	3.69	.743	62.7
9. Just the right amount of information on screen (PU)	3.69	.857	65.7
10. Liked the colours of the rooms (PEOU)	3.66	.880	62.7
N = 67			

The Korean sample survey yielded a Cronbach Alpha of 0.905, which satisfies the requirements of reliability (Lim, Khine, Hew, Wong, Shanti & Lim, 2003). As shown in Table 5, Koreans students reported favourable attitudes towards the items in the survey questionnaire, with many items scoring over the midpoint of 3 on the scale. 88% of Korean students reported that they found the buttons and links in the module easy to understand and were able to bring them to the correct pages (m=4.03), and 79% were able to understand the content in the website (m=4.00), both of which ranked first and second in the survey. The third highest item in the survey was

the suitability of the furniture of the health rooms, with a mean of 3.97, as reported by 79% of the students. Navigation was also favourably reported by 70% of the students (m=3.94), as were the instructions in the website (3.82, 69%), which enabled them to gained more knowledge of Korean health rooms (m=3.84, 71.6% of students reporting), and received enough information on each screen to process (m=3.69, 66%). 63% of students also found that the colors chosen for the healthrooms in the website were suitable for the students who will be using them (m=3.84, and m=3.66). Overall, the majority of Korean students liked using the website to learn about health rooms in Korea (m=3.69, 63%).

Table 6 Top 10 highest ranked means for the Malaysian sample

Items on survey questionnaire	Mean	Std. Deviation	%
1. Ease of navigation (PEOU)	4.09	.924	86.4
2. Understanding of content (PU)	4.08	.829	81.8
3. Instructions were easy to understand (PU)	3.98	.832	78.8
4. Ease of buttons and links to navigate (PEOU)	3.95	.831	75.8
5. Increased understanding of Korean Health rooms (PU)	3.95	.812	77.3
6. Suitability of colours of the health rooms (PU)	3.88	.832	78.8
7. Suitability of furniture for health rooms (PU)	3.83	.938	72.7
8. Enjoyed learning from the website (PU)	3.82	.893	66.7
9. Informative and useful website (PU)	3.82	.700	74.2
10. Important information were easy to find (PEOU)	3.80	.769	68.7
N = 66			

Analysis of the Malaysian students survey yielded a Cronbach Alpha of 0.922, which also satisfies the requirements for a reliability (Lim, Khine, Hew, Wong, Shanti & Lim, 2003). As shown in Table 6, for the Malaysian students, the ease of navigation of the module was the highest ranked item in the survey, with 86.4% of students and a mean of 4.09, and 4th highest ranked item (75.8%, m = 3.95). They also reported that they were able to understand the content (m = 4.08, 81.8%), found the instructions easy to understand (m=3.98, 78.8%) and that the website was informative and useful (m=3.82, 66.7%), as important information were easy to find (m=3.80, 68.7%). 78.8% also reported that they found the colours chosen for the health rooms to be suitable for students (m=3.88, 78.8%), and that the furniture in these health rooms were also suitable for its purpose (m=3.83, 66.7%). Overall, 77.3% of students found that they were able to gain more understanding of Korean health rooms from the website (m= 3.95).

STUDENTS' COMMENTS

In addition, the survey also sought to solicit open-ended comments from students on their perceptions of the web application. These comments would further support students' perceived usefulness and perceived ease-of-use of the web application and provide insights as their attitudes and intentions to use the application. Students' comments can also be categorised according to content, interactivity and navigation, and visual appeal. Some of the comments are presented in Tables 7-9 below (Note: The comments are taken verbatim).

Table 7 Korean and Malaysian students' comments on Content of the web application

CONTENT (Perceived Usefulness)
Korean students' comments
"It's useful and necessary. I didn't that interested in these contents before, but after using this website, I had a chance to know this information a lot" *"I think it is useful…it is necessary since it is difficult to get access to this information"* *"Need! People need it for their children's environment, as beneficial to the family that are wondering"* *"…people that want to view n know more about health unit will come to this website"* *"Elementary school children are easy to get weak/ill, having a health unit to be taken care of are relieved(for parents) to be able to know from the site"* *"Many of the parents worry or problem, allowing them to get the peace of mind"* *"…necessary, because to know about the condition of the health unit"* *"…useful, able to know about Korea and the school health unit facilities"* *"useful and necessary, able for parents to know"* *"necessary, parents and children able to know about the school facilities through this site. they will feel safe"*
Malaysian students' comments

"very useful because of the information they provide" *"..people from other country can learn about Korean health room"* *"…it is useful. They provide plenty of information of the health room"* *"..take care of health of their student should be a part of the job of a school"* *'..it can educate people about health room"* *"Really useful…I can see the different between health rooms in Malaysia and Korea"* *"..it can be used as a learning website for Malaysians on how to improve our health rooms"* *"..for parents and kids to learn more about health rooms"* *"..for student to know the facilities in the room"* *"…it given opportunity to other people to learn about health rooms in Korea and allow other school to reference and make their health room better"* *"Absolutely useful and necessary – for instance, those information would be useful for parents, students themselves, evaluation purposes, etc."* *"…Malaysians can get ideas on how to renovate their health rooms here in Malaysia"*

Table 8 Korean and Malaysian students' comments on Visual Appeal of the web application

VISUAL APPEAL (Perceived Usefulness)
Korean students' comments
"I think the website has a good user interface design" *"..it's good because it together with photos and descriptions"* *"good to able to view various health unit in once"* *"It was convenient to use due to having photos"* *" A sense of stability and gives a comfortable feel"* *"Thats good use of comfortable color able to rest and go."* *"Design was appropriate for students"* *"It wasn't that boring due to photos."* *"I liked that I could look the interior of the health rooms closely."* *"The color scheme of interior and other elements are well coordinated"* *"Used colours that the children's eye will find it interesting, able to make them feel safe and relax"* *"I liked the detailed explanation and lots of photographs"* *"I think the website has a good user interface design."* *"I like the simple and neat design."* *"I like that I could take a look the facilities of schools through the photographs. And I like the color on the website!"*
Malaysian students' comments
"I'm enjoying it" *"Nowadays, youngsters are getting more on their electronic devices. So this is interesting website of health is one of the way for the young generation to learn more knowledge"* *"Colour scheme is nice and comfortable…It is calm…patients are able to rest peacefully"* *"I like the colour. It catch my eye attention. Good!"* *"I like about the interface in the design because it looks simple and nice"* *"The colours are soft, it won't make people's eyes feel tired after watching it"* *"I think the color is bright and colourful. Sets up the mood for the student"* *"Calm and relaxing"* *"It's appealing and isn't too striking for the eyes too"* *"Nice. The colour scheme is cool temperature"* *"Smooth, comfortable. Cozy"* *"I particularly liked the pictures of the health rooms"* *"Variety of pictures"* *"I like the design because it is modern and minimalist"* *"I like the character which placed in the ABOUT page…I like the colour palette for the health room as the design is simple. And it makes the health room looks nice and tidy"* *"I like the design concept. It is not too complicated"* *"Very appealing and appropriate for the topic"* *"Colours used for this website were suitable according to the furniture and light in respective rooms"* *"Great. Very calming ad it ease the mind. Somehow it reduce stress"*

Table 9 Korean and Malaysian students' comments on Interactivity and Navigation of the web application

INTERACTIVITY AND NAVIGATION (Perceived Ease-Of-Use)
Korean students' comments
"Since there are table of contents, I could fine what I want to know quickly" *"Able to see one school's health room with one click."* *"..it easy to view photos"* *"Good because each school for each classification, along with detailed photo"* *"Each school is given a separate point was good to hear"* *"Design and location of the health unit where it is easy to know that it was good"* *"Simple configuration and easy to find on the Internet"* *"Since there are table of contents, I could fine what I want to know quickly."* *"It was easy to use."* *"I liked that I could check the information available simply with just a few mouse clicks."* *"It was easy to use because of simple and well-ordered design."* *"I liked the website is so simple and easy to use."*
Malaysian students' comments
"Easy to navigate" *"Information and navigation is easy to understand"* *"…easy access to the information"* *"…convenient for people to search and learn more on it"* *"…navigation is simple and easy"* *"It is easy to navigate on this website"* *"It is easy to access"* *"It is easy to navigate through. There was no broken links and I got where I want to easily"* *"User-friendly and easy to navigate"* *"The navigation is most appealing for this website"*

From the comments, it can be seen that both Korean and Malaysian students were very positive about the 3 constructs in the survey, which further provided strong support for the Likert scale results in Tables 5 and 6. The majority of them reported that the web application contained content that was easy to understand and very useful. Many Korean students commented that the website would be a useful and necessary application for parents to feel safe knowing about the state and condition of their children's health rooms in schools, and also on the safety of the these students knowing what their health rooms would look like prior to going to them. Malaysian students commented that the website would be a good reference for Malaysian schools to use to improve or develop their own health rooms in school.

With regards to visual appeal, Korean students commented on the use of photographs as the media element to making the website more appealing. Many commented that these photographs, coupled with the textual content, were complementary in providing the necessary information about the health rooms, making the application enjoyable to engage in. These were also supported by comments from the Malaysian students who found the design of the website to also be appealing. Overall, both Korean and Malaysian students found the colours used in the website to exude calmness and relaxation when browsing through the content, which they commented to be suitable for the web application.

Finally, the students also provided comments on the interactivity and navigation of the web application that also supported the quantitative results in Tables 5 and 6. Korean and Malaysian students commented on being able to access the photos easily and with one click, and that the navigation was easy to use. They also elaborated on the user-friendliness of the website in terms of having "*..no broken links*" and its "*simple configuration*" which made it "*…easy to find on the Internet*"

Therefore, results and comments for all 3 of these constructs show strong and positive support for the TAM model's perceived usefulness and perceived ease-of-use of the web application, and influencing their positive attitudes towards it. According to Davis' (1989) Technology Acceptance Model (TAM), perceived usefulness and perceived ease-of-use influence students' perceived intentions to use a particular system. Results of the study also show that students had positive intentions to use the web module. With regards of their perceived intentions to use the web module, both Korean and Malaysian students commented that they would use the website, with the following elaboration on some of them:

1. *"..I'd use it to get information. It could be so useful not only for children, but also their parents as well. When it comes to children's health, parents are always worried and concerned. Therefore, through this website, parents might get a chance to know about the health rooms' information and to take a look*

around the facility."

2. *"Yes, I'm going to use it."*
3. *"I'm going to use it when I need the information regarding the health rooms."*
4. *"I might often use the website because it's convenient to use."*
5. *"If there are more sample of health unit, I might use this website"*
6. *"Likely to visit in order to obtain the information"*
7. *"I can use it for an example for similar projects"*
8. *"Yes, for sure, as it is important to get every detail of the health rooms. And for this website, it satisfies the viewer in terms of the information needed"*

The students also provided helpful suggestions on the maintenance and continual improvements of the website in terms on updating the information, expanding the web module to include more health rooms, and to add more graphics to the site. However, these suggestions did not deter them from their positive perceived intentions to use the web application in the future.

DISCUSSION AND CONCLUSION

Based on the results above, the study was able to show that the web application, which was built on Mayer's (2001) Principles of Multimedia Learning, was successful in effecting positive students' perceived usefulness (PU), perceived ease-of-use (PEOU), and attitudes towards usage (ATU), of an e-learning web module on health rooms in Korea, and consequently, positive perceived intentions to use (PIU) the module in the future. In particular, the study showed that Mayer's (2001) Principles of Multimedia Learning was an effective theoretical framework to use to effect these positive perceptions. Students commented on the use of text and graphics together to enhance the content provided, the use of a character graphic in the ABOUT page to make the web module appealing, and the use of relevant information such as Google maps to further enhance the content.

Colour was an effective component of the module to engage students in the application. Students reported and commented on the suitable use of colour as a way to affect the mood of the audience and provide a calm and relaxing atmosphere for them to engage in the module. This result is consistent with Cyr, et. al's (2010) suggestion that *"website colour appeal is a significant determinant for website trust and satisfaction…"*(p.1), and Gaines & Curry's (2011) conclusion that colour has significant influences in learning environments.

Positive perceived usefulness and positive perceived ease-of-use have positive effects on students' perceived intentions to use, and is consistent with Davis' (1989) technology acceptance model (TAM). In this study, results showed that content and visual appeal were able to contribute to students' positive perceived usefulness, and interactivity and navigation contributed to students' positive ease-of-use. Both Korean and Malaysian students' reported that the web module was necessary and important for parents and children to know about school health rooms to enable them to feel safe and secure. These were further supported by their comments. While Korean students commented more about the necessity of the web module, Malaysian students commented on the usefulness of the web module as a reference for development or improvement for Malaysian health care rooms. User-friendliness and easy navigation were also important elements in their overall perceived intentions to use. Many commented that they would use the website because it provided useful information, was deemed necessary, was easy to use and convenient. These results were consistent with Schroff et. al's (2011) findings that user-friendliness and easy navigation were influential components in students' PU and PEOU of technology.

In conclusion, the web module and the use of Mayer's (2001) Principles of Multimedia Learning was an effective tool to engage students in interactive learning with an e-learning application. The technology acceptance model (TAM) was also an effective model to use to measure the attitudes and perceptions of students on the perceived usefulness and ease-of-use of the module and their consequent perceived intentions-to-use the module in the future. The study also provide insights into the attitudes and perceptions of Korean and Malaysian students towards using e-learning modules, and to gives educators further confirmation on the effectiveness of using sound multimedia and e-learning pedagogy in designing content that will engage and improve student learning.

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