Using Mobile Device for Learning: From Students' Perspective

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This study aims to examine students' acceptance of mobile technology usage for learning. A questionnaire designed with five open-ended questions was distributed to 20 students from the Faculty of Industrial Art and Design Technology of Unisel (Universiti Industri Selangor), Malaysia. Results construes that students were not keen on m-learning (mobile learning), as they did not rely greatly on the mobile phone in assessing their learning materials such as lectures and lab sessions. They were more familiar with studio-based and face-to-face learning approach instead of m-learning and were not receptive to this new idea of learning using mobile technology, even though they always used the mobile device features. The limitations in the mobile device feature, costs and its usability become the prominent factors that hinder the students from fully accomplishing their m-learning exercises. They were willing to explore the idea of using mobile technology for learning, especially in a studio-based setting. They did not see any improvement of knowledge from the perspective of the learning process know-how to the show-how on mobile technology usage for learning. They could not relate to any learning connection between mobile technology and studio-based learning, even though in the first part of the case study, the results have shown positive attitude and acceptance on the study made on a sample lesson of form, space and gestalt theory in the graphic design subject. Students also obtained analogous experiences on small size keypads, screen resolutions, and navigation which could be the major problematic factors to them and thus, affected their m-learning process as it was unfriendly to use and the device was prone to damage. They have yet to accept that the concept of mobility in learning is applicable to the learning process, apart from utilising a mobile device for casual usage. However, this limitation does not restrict the students from exploring this new learning environment in the future, since they were willing to increase their learning exposure using mobile device.

Keywords: mobile, mobile device, learning, knowledge, informal learning, Malaysia

Introduction

Quinn (2000) defined m-learning (mobile learning) as the "intersection of mobile computing and e-learning (electronic learning): "accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-learning is independent of location in time or space" (p. 8). Meanwhile, Sharples, Taylor, and Vavoula (2007) defined it as the process conversations across multiple contexts amongst people and personal interactive technologies. Wood (2003) indicated that m-learning is location-based, situation-dependent and based on interaction between mobile devices and learners. A wide definition of m-learning is the ability to learn independently of place and

time, facilitated by a range of mobile devices (as cited in Learndirect & Kineo, 2007). They enlisted the M-learning series of characteristics that potential buyers and designers should be aware of.

There was a general opinion that schools, colleges and universities would absorb and digest personal mobile technologies, just as they had all previous technologies, without profound change (Sharples et al., 2007). However, it was noted that many pockets of tension were likely to take place between social and educational technology use, and that integration would need to take a variety of forms (Sharples et al., 2007). According to Sharples et al. (2007), children in general did not want school to intrude in their personal life. There was a danger that the enthusiasm of schools, and some parents to extend school by, for example, parent access to school intranets, bite-sized teaching and revision via SMS (short message system), and new technologies such as location-based tracking, might be seen by children as schools attempting to colonize and control their social world (Sharples et al., 2007).

According to Sharples et al. (2007),

> There is a need to discuss where the bounds of the school lie and where it is not legitimate for formal education to intrude on childhood. There is an urgent need for teachers, parents and policy makers to understand the new technologies and the new forms of online interaction. They need to debate with young people the issues not only of how these can be harnessed for the purposes of formal education, but whether they should be, and if so, how.

This paper therefore aims to examine the students' acceptance of mobile technology usage for learning. The study was conducted at the design studio in the Faculty of Industrial Art and Design Technology of Unisel, Malaysia, via face-to-face mode with the students.

Literature Review

The mobile phone is a necessary device for living. In early 2009, there were around four billion mobile subscribers worldwide. GSM (Global System for Mobile Communications) is still the most popular mobile technology (MarketResearch.com, 2009). Mobile phones are varied in size, design and model. The varied designs are meant to cater for varied customer tastes. There exist assumptions that the users of mobile technology consisted of youngsters but the usage is equal across all users. Studies showed that the range of learners whose needs might be met by m-learning includes mature aged, gifted, and remote learners, as well as those with cognitive, behavioral or social problems, or with physical or mental difficulties (Rodríguez, Nussbaum, Zurita, Rosas, & Lagos, 2001; Savill-Smith & Kent, 2003; P. Strom & R. Strom, 2002). Cobcroft, Towers, Smith, and Bruns (2006) argued that constant exposure to digital technologies, gadgets, games and mobile devices had evolved a new breed of learners, the digital natives: those learners who think and process information fundamentally differently from their predecessors, and the digital immigrants, whose interaction with these digital tools is not innate.

Zurita and Nussbaum's (2007) survey of student opinions regarding college teaching and learning basic mathematical skills on handheld computers were interconnected by a wireless network. The result shows that the students had minor technological problems but by the end of the pilot study they were experts. The students realized that mutual support was fundamental in achieving their goal. The study shows positive effects on the student social interaction, motivation and learning.

In Motiwalla's (2007) study, the students found the m-learning useful and a good complimentary tool for the classroom interaction. They rated neutral on ease-of-use, but found the interaction tools easy for discussing course materials with other students and instructors. They found the mobile phone keypads and screens very

difficult while navigating, reading and typing their messages. However, once they overcome this user-interface hurdle the m-learning applications used for classroom interaction were easier to understand. The students foresee m-learning as an effective learning tool or aid, providing flexible access from anywhere and convenient to use application. Students also perceive an important supplementary role for wireless/handheld devices in e-learning and are effective in delivering personalized content. Unlike desktop e-learning, m-learning has the benefits of mobility and its supporting platform, which can be summarized as being usability, technology usage, connectivity and accessibility.

Usability is more elusive. Software tools need to be usable without incremental effort. What is the point of automation if it takes more work to do the job with the software than without it? In the often hands-free and eyes-free environments where m-learning is most appropriate for just-in-time learning support, complicated key controls and difficult-to-read screen presentations will only be tolerated under certain very limited conditions. The rest of consumers are not willing to risk having a bad experience. For broad and long-term adoption, the experience really did matter (Wagner, 2005). A usable device is satisfying, easy to use and improves learning effectiveness and efficiency. An accessible device meets the needs of users with specific learning difficulties or disabilities, such as visual, hearing, speech, mobility or manual dexterity impairment. Usable and accessible devices are keys to creating an inclusive m-learning environment.

M-learning could complement other teaching and learning methods or replace them, and could be modeled in the same way as other methods (Traxler & Kukulska-Hulme, 2005). It can also enhance non-academic and para-academic support, such as pastoral care, feedback and remediation, motivation and guidance, supporting students across the institution, course administration and management, and institutional quality assurance.

Wireless networking connectivity is increasingly built into current handhelds, and can be added to older models with a wireless adapter card. The oldest of these technologies is infrared, now being widely replaced by Bluetooth. Although it only connects with adjacent devices, such as other handhelds or printers, Bluetooth transfers data faster than infrared. Bluetooth enables handhelds to access the Internet by connecting to Bluetooth-enabled mobile phones, which contact an ISP (Internet service provider). Smart phones connected directly to an ISP without additional equipment or adapters (Traxler & Kukulska-Hulme, 2005). As more people gain greater comfort with simple mobile applications like SMS text-messaging and mobile Web-surfing, the greater will be the demand for broadband service. As bandwidth increases and media players like Flash continues to improve users' experiences, mobile applications will continue to increase rapidly.

Handheld digital devices were becoming more common, and their quality and capability were increasing due to technological breakthrough in miniaturization and advancements in wireless bandwidth and data networks (Keegan, 2002). Important characteristics for m-learning devices and tools should be that they are highly portable, can be individually adapted to the abilities, knowledge and learning styles of the user, unobtrusive, available anywhere and adaptable, persistent, useful and intuitive for people who have no prior experience with technology. Beyond that, we knew that portability could foster a greater feeling of ownership over learners' work (Passey, 1999).

Indeed, a mobile computer-supported cooperative learning environment greatly enhanced mobility, coordination, communication, organization of materials, negotiation and interactivity over traditional cooperative learning environment (Zurita & Nussbaum, 2007). Roschelle (2003) demonstrated five reasons for using wireless devices in cooperative learning: (1) Augmenting physical space; (2) Leveraging topological space; (3) Aggregating coherently across all students' individual contributions; (4) Conducting classroom

performances; and (5) Students' acts becoming artifact.

The literatures implied that applications designed for use on mobile phones must take cognizance of users' preferences. In teaching and learning, the application should conceptualize the learner (Conole, 2004). It seemed that engaging students and making them active participants rather than passive listeners led to higher learning outcomes (Prosser & Trigwell, 1999; Ramsden, 1992). Interaction and active participation allowed students to share ideas and applied their knowledge, exposed them to perceptions of their peers, made learning more enjoyable, and allowed the lecturer to test understanding (Sixsmith, Dyson, & Nataatmadja, 2006; Slain, 2004).

Methodology

As many as 20 students, 10 males and 10 females, aged about 19-20 years old, from the Faculty of Industrial Art and Design Technology of Unisel, Malaysia, were selected as respondents for this exercise. The method of sampling used is the stratified random sampling method. Participants were chosen based on an extracted name list in accordance with the active involvement of the members in the assigned group, out of the total student list involved in the study. The students were familiar with the m-learning setting in the earlier case study conducted in a sample lesson of form, space and gestalt theory in the graphic design subject. They have to complete an open-ended questionnaire asking their opinion about their acceptance/adoption of mobile technology for learning. Questionnaires were distributed to them at the design studio.

An open-ended questionnaire comprising five questions was distributed to the participants. The first question revolves around the participants' opinion on the usage of mobile technology for learning and their reliance on the mobile phones in assessing and delivering their learning and teaching material such as lectures and lab sessions. In the second question, the participants were asked whether the mobile device feature and content enhanced their knowledge from the perspective of the learning process from the know-how aspect to the show-how aspect. The third question ponders about the respondent's opinion whether m-learning could enhance their knowledge on the subject that they find difficult to understand. In the fourth question, the participants were asked about the problems that they faced in the learning process, namely, the keypad, screen resolution, navigation etc., that restrict their learning and viewing experience while using the mobile devices. The last question probed on the participants' opinions on the concept of mobility in learning, the application of this concept in the learning process and whether the mobile phone can replace the function of the university, to gain knowledge in the future.

Results

Students' responses to the five questions on their acceptance of mobile technology usage for learning are presented in this section.

Learning Reliance on Technology

This first question requires the students to provide their opinions on the usage of mobile technology for learning and their reliance on the mobile phone in assessing and delivering their learning material. The derived results embrace four important aspects as discussed below.

Resistance of usage. More than 80% of the students did not rely greatly on the mobile phone in assessing their learning material such as lectures and lab sessions (see Figure 1). Most of the students (S1, S2, S4, S12, S13, S14 and S15) had some resistance on the usage of mobile technology for learning. S1 stated, "No, I do not like the idea. There's no line coverage". S2 stated, "I don't rely greatly on mobile phone". S4 indicated, "No, I do not

agree about the usage of mobile technology for learning. I do not have a phone and the phone line coverage at my place is very poor". Meanwhile, S12, S13, S14 and S15 pointed out respectively, "No, I do not like to use mobile phone for learning", "No, it is not suitable for learning", "No. It is difficult to see the information" and "No, I don't like to view my learning material on mobile phone". Many of the students were reluctant to accept mobile technology usage for learning because they were unfamiliar with this new idea of learning. They used to learn using a studio-based approach, and thus they were not open to this new learning concept.
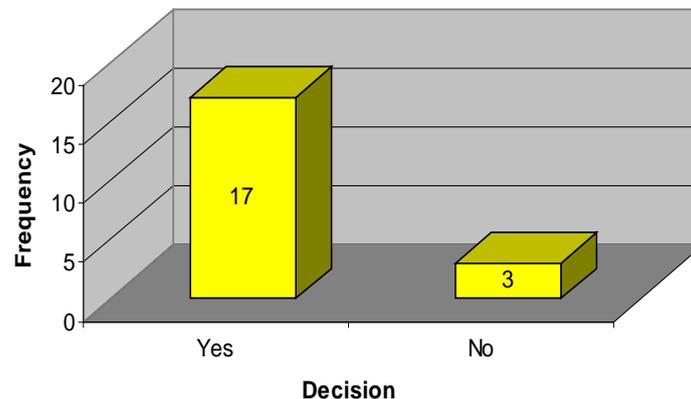
Figure 1. Resistance of usage.

Reliance and dependency on face-to-face learning approach. Other analyses reveal that the students did not rely on mobile technology usage for learning. They were more confident to learn via face-to-face learning approach in a studio-based learning environment. S3 stated, "No, I prefer the face-to-face lecture"; S6 indicated, "No, the lecture material would not be the same and clear as the face-to-face lecture session". Meanwhile, S7 highlighted, "I do not like to use mobile technology for learning, because I depend greatly on my lecturer's tutorial. The explanation is more understandable and clearer than the mobile screen". S10 seems to agree as he noted, "Mobile phone is not reliable for learning. I prefer the face-to-face teaching method". Another student, S8, however mentioned, "I prefer to use e-learning system".

Willingness to adopt the mobile technology for learning. Several students, S16, S18, S19 and S20 were willing to adopt mobile technology for learning. S16 indicated, "It could be useful to certain extent". Meanwhile, S18 stated, "Yes, it is fine for simple learning content. However, it is not feasible to use the mobile phone in a complex learning condition such as tutorial and lab experiment session". Then, S19 confirmed, "Yes, but it could only be an alternative tool to conventional face-to-face learning method". S20 also pointed out, "Yes, but I do not like my lecturer to rely greatly on mobile phone for their learning deliverance". In considering the studio-based approach, some of the students could accept the intervention of mobile technology into their studio-based learning. They felt that certain features of the devices such as the camera and the video could assist their understanding in learning by using graphics and motions.

Limitation of cost. The analysis also shows that students did not rely on mobile technology for learning due to the limitations of cost. This is evident from students' (S5, S9, S11 and S17) opinions. S5 indicated, "I do not like to use mobile technology for learning because it is costly for a student to buy the mobile prepaid credits". Meanwhile, S9 mentioned, "No, I could not afford to buy expensive high tech mobile phone". This is followed by S11 who indicated that, "No, it is costly and my phone does not have the advance feature of a smart phone". Lastly, S17 said, "I prefer the conventional teaching and e-learning method. Mobile phone is

costly for me". Seemingly, students with limited amount of allowances relied greatly on the mobile phone for these reasons. On average, the cost of a mobile phone is RM (Malaysian Ringgit) 500 and below, which depends on the type of phone available in the market. They can afford to their own mobile phones with basic features but not interactivity and advance features of MMS (multimedia message system), camera, video, audio, GPRS (general packet radio services), Bluetooth and smart phone.

Improvement of Knowledge From the Perspective of Learning Process Know-How to the Show-How

There are two aspects of concerns expressed by the students on whether the mobile device feature and content enhance their knowledge from the perspective of the learning process from the know-how aspect to the show-how aspect: (1) Skeptical opinion on the improvement of knowledge; and (2) Improvement of knowledge.

Skeptical opinion on the improvement of knowledge. Many students were skeptical about the use of mobile technology to improve their knowledge. For example, many students (S1, S3, S4, S8, S9, S12, S13, S14, S15, S16, S17 and S20) stressed, "No, it does not improve my knowledge"; "There are many more devices for improving knowledge in a more effective way"; "In certain condition, it does improve my knowledge but mostly I do find that it is just wasting my time to study"; " I'm not aware of this because my phone has very limited feature"; "Not really. The contents and gaming applications usually replicate what we understand before"; and "No, it will make you become a loner". Most students were reluctant to use this new learning due to their norms in the current studio-based setting. Negative behaviors were noticeable out of this observation. They lost concentration on the m-learning activities where they ended up chatting and browsing infotainment and entertainment content instead of the learning.

Improvement of knowledge. There were six students who liked the idea that mobile technology could improve their knowledge (see Figure 2). For example, some students (S2, S5, S6, S7, S11, and S18) indicated, "Yes, It does. New and interesting content influence my learning process"; "Yes, it may improve my knowledge"; "Yes, it could stimulate and activate my mind/brain work"; "Yes, the mobile phone features and function help me to communicate better and improve my knowledge"; "Sometime, it does improve my knowledge in certain condition and situation"; and "I'm inquisitive with mobile content. Mobile games are meant for fun, but not for knowledge acquisition". These are due to the size and convenience factors of the mobile device that they could easily carry and access with them while on the go.
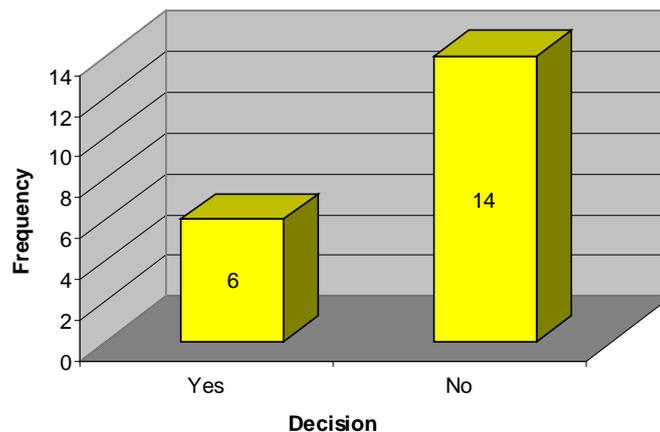
Figure 2. Improvement of knowledge.

Enhancement of Knowledge on Difficult Subjects

In terms of whether m-learning could enhance students' knowledge on the subject that they find difficult to understand, two issues are worth noting.

Casual usage of mobile device. Many students noted that mobile technology could enhance their knowledge of difficult subjects. For example, students S1, S2, S4, S7, S8, S9, S10, S11, S13, S15, S16, S18 and S19 stressed, "No, I prefer the face-to-face learning style"; "No. The face-to-face method and textbook is the best guide to address the difficult subject"; "I do not agree. It could not enhance my knowledge on difficult subject"; "It could not enhance my knowledge on difficult subject"; "No, mobile device is for fun and communication not for learning"; "No, it's difficult to catch up the subject using mobile device"; "I doubt that mobile device could enhance my knowledge on difficult subject"; "No, I just use it casually for relaxation"; "I do not have the experience"; and "No enhancement. I find it's hard to learn". It does show that 70% of the students did not notice that mobile learning could enhance students' knowledge on difficult subjects. They perceived that mobile phones are used casually for relaxation. In fact, they found that the textbook and the face-to-face methods or learning styles are the best guide to address the difficult subjects rather than using the mobile phone as a tool. Furthermore, students have some difficulties in catching up with the subjects using mobile phone.

Acceptance on the enhancement of knowledge on difficult subjects using mobile technology. Only 30% of the students indicated that the usage of mobile technology in learning could enhance their knowledge on difficult subjects. For example, students S2, S5, S6, S12, S17 and S20 mentioned, "Yes, it might enhance my knowledge on difficult subjects namely design process subject"; "Yes, History of Art and Design Process is a difficult subject to learn. I'd like to learn this subject using mobile learning approach"; "Yes, it could enhance my knowledge on difficult subject namely design process"; "The visual communication subject may be converted into a simple mobile content for m-learning"; "Yes, it depends a lot on the subject of learning" and "Yes it may, the subject is History of Art".

Constraints on the Learning Process

Question number four requires the students to furnish reaction to the problems that they faced with in the learning process, namely the keypad, screen resolution, navigation etc., that restrict their learning and viewing experiences while using the mobile devices. Results are presented as follows.

Usability constraint. A prevalent number of students (90%) have the same opinions with the lecturers. It is hard for them to use the keypad due to its small size and they found it easier to use the computer keyboard rather than the mobile phone keypad. Furthermore, the viewing and learning experience is not clear enough due to the small size of the screen resolution. They also faced with navigation problems due to the device feature restrictions.

For example, students S1 and S2 mentioned, "the devices get damage easily" and "I face navigation problem due to the device feature restrictions". Meanwhile, students S3, S4, S6, S7, S8, S10, S11, S12, S13, S15, S16, S17, S18, S19 and S20 stated, "It gives too much pressure on my fingers"; "It's hard to use the keypad due to small size. I find it easy to use the computer keyboard rather than the mobile phone keypad"; "The viewing and learning experience is not clear enough due to small size keypad and screen resolution"; "Small screen resolution. My phone does not have the advance features such as MMS, camera, video and audio"; "It is better to use touch screen function, such as i-Phone", "Yes. Definitely, these limitation factors affect my learning process"; "The screen resolution is small and my mobile phone does not have the advance feature"; "Absolutely, these are the problematic factors"; "Its feature is unfriendly to use"; "Screen resolution

restricts my learning experience"; "Small screen could be the major problem"; "I face navigation problem in the learning process using mobile device"; "Screen resolution restricts my learning experience"; "The screen resolution degrades my interest in using mobile technology for learning"; and "The small screen frame strains my eyes in long hour's usage".

However, students S14 and S9 indicated, "No, I do not face any problem" and "No, it is quite fine", while student S5 further mentioned, "These are all minor problems. My major problem is the costly phone bills". Overall, both participants agreed that there exist numerous restrictions in the learning process while exercising the m-learning case study. Mobile phones are available in different screen size resolutions. Thus, the keypad, screen resolution and navigation restrict students' learning and viewing experiences in their exploration of information by the use of mobile phones. All of these factors degrade the users' interest in using mobile technology for learning.

Mobility in Learning

The final question attempts to elicit students' opinions on the concept of mobility in learning, the application of this concept in the learning process and whether the mobile phone can replace the function of the university, in order to gain knowledge in the future. Two issues are paramount to the lecturers: (1) Inverse opinion on mobility in learning; and (2) Acceptance on mobility in learning.

Inverse opinion on mobility in learning. Contradictorily, students in Malaysia have yet to accept fully that the concept of mobility in learning is applicable to their learning process. The majority of the students involved in this research study provided inverse opinions on this statement. For example, students S1, S6, S8, S12, S13, S15, S16, S17 and S20 mentioned, "No, I do not agree"; "I do not like the concept. The mobile phone is small and it is difficult to use for learning. It could not replace the function of university in future"; and "I don't like the concept. It could not replace the function of university". Meanwhile, students S4 and S9 stated, "I do not think mobile phone is good for education. It is just for fun and communication purposes" and "No, I do not like mobile phones to replace face-to-face learning method. I tend to use it more for entertainment". They perceived that m-learning would never replace conventional educational methods that they are familiar with, and it could not replace the function of universities in future. It could only complement the function of universities towards the dissemination of knowledge.

Acceptance on mobility in learning. Some of the students were reluctant to accept the new concept of mobility in learning. They preferred the face-to-face lecture and tutorial as the best media for learning instead of mobile phones. Furthermore, there are other tools for learning such as the computer and notebook. The constructive reason is that the mobile phone is small and difficult to use for learning. They sensed that the mobile phone was less suitable for education, but only beneficial for fun and communication purposes. For example, students S2, S3, S5, S7, S10, S11, S18 and S19 mentioned, "It's not effective, because there are other tools for learning, such as computer and notebook. The mobile phone could not replace the function of university"; "The mobile phone could not replace the function of university. The mobility concept is not effective, because there are other tools for learning, such as laptop"; "No, it could only complement the function of university towards the dissemination of knowledge"; "I would give it a try. It could complement the classroom learning"; "I prefer the face-to-face lecture as the best medium for learning"; "I like the idea. It helps me a lot whenever the lecturer is away from the campus. It saves me in terms of time factors"; "I like the idea but mobile learning will never replace conventional education methods"; and "It is good to apply the mobility

concept. The mobile phone could not replace the function of university".

Conclusions

Overall, the results explained that students were not keen on m-learning. The majority of the students did not rely greatly on the mobile phone in assessing their learning materials, such as lectures and lab sessions. They were more familiar with studio-based and face-to-face learning approaches instead of m-learning. Therefore, they were not receptive to this new idea of learning using mobile technology, even though they always used the mobile device features such as the SMS and MMS for communication, infotainment and entertainment. The limitations in the mobile device feature, costs and its usability become the prominent factors that hinder the students from fully accomplishing their m-learning exercises. This setback does challenge the lecturer on how best learning should be designed and delivered to the student, which is because the students were sceptical to this new learning approach. They could not see any relevance of using the technology within a studio-based learning setting. However, they were willing to explore the idea of using mobile technology for learning, especially in a studio-based setting. It seems that students with limited amount of allowances relied greatly on the mobile phone for these reasons. They did not see any improvement of knowledge from the perspective of the learning process know-how to the show-how on mobile technology usage for learning. They could not relate to any learning connection between mobile technology and studio-based learning, even though in the first part of the case study, the results have shown positive attitude and acceptance on the study made on a sample lesson of form, space and gestalt theory in the graphic design subject.

Furthermore, students obtained analogous experiences on small size keypads, screen resolutions and navigation which could be the major problematic factors to them and thus, affected their m-learning process as it was unfriendly to use and the device was prone to damage. They have yet to accept that the concept of mobility in learning is applicable to the learning process, apart from utilising a mobile device for casual usage. They held a belief that the mobile device is not suitable for learning. This is due to several hindrances that they faced with, namely lack of device feature, ergonomics and costs as pertinent attributes that limit their experience while conducting the sample lesson. Due to these limitations, they were skeptical towards the usage of mobile device for learning. For that reason, they generalized that the mobile device was not suitable for learning, even though, they were receptive towards the sample lesson conducted. This also led to their inverse opinion on mobility in learning. However, this limitation did not restrict the students from exploring this new learning environment in the future, since they were willing to increase their learning exposure using mobile device.

The use of mobile phones in the classroom has the potential to increase some negative outcomes or distractions such as phones ringing during class or students engaging off-task activities (e.g., sending messages to their friends). Both students and educators can benefit from an additional channel of communication—SMS messages via mobile phones—in the classroom. The lecturer perceived a gain of quality and quantity of feedback from the students. Students indicated that the system was useful—making classes more interesting and interactive. The open channel was found to be an especially useful, efficient and preferred method of communication, in comparison to the traditional "raising hands" method of asking questions, which was increasingly impractical as class sizes grew. To wrap up, the findings on knowledge transformation and discovery are important to benchmark new values of learning in the mobile learning environment for the art and design background in academic towards bridging the formal and informal settings of the learning experience. With mobile learning still in its infancy, a deeper understanding of its design principles as well as of arising opportunities and limitations is

paramount. Thus, this research has opened up a space for future researchers to deepen their understanding on the users' perception of mobile learning. A new research extension should be set out to study how the best features of mobile technology could be used as a new curricular in the learning environment.

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