

ORIGINAL ARTICLE

Screening of Medical Students' Intention to Practice Mobile – Learning in Malaysia.

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ABSTRACT

Introduction: The twenty-first-century learning is adopting the student-centered learning techniques and the teachers are mainly facilitators to direct the process of learning and so social media and mobile applications became an important learning platform. Mobile learning (M-learning) is the practice of learning activities through a portable device such as cellular phone or a personal digital assistant. The aim of this research is to screen the medical students' intention toward the adoption of M-learning and to determine factors affecting the intentions of the medical students to practice M-learning. **Methods:** A cross-sectional study among medical students was performed through a questionnaire based on the Theory of Reasoned Action and the Technology Acceptance Model. The study included 129 students in different stages of the medical study. **Results:** Results showed that the factors affecting the students' intention to practice M-learning include the students' attitude, perceived usefulness, perceived ease of use, and availability of resources. In the current sample 82.7% of students are already using M-Learning; 41.7% are using it for assessment, 22.8% are using it for learning and 35.5% are using it for both. **Conclusion:** It was concluded that most medical students have higher intention to adopt M-learning and they are mostly using it for assessment purposes rather than in learning.

Keywords: Mobile-learning, Medical students, Malaysian, MSU

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INTRODUCTION

Nowadays cellular technology became a recent paradigm in university education where the utilization of cellular gadgets in the gaining knowledge is called mobile learning (M-learning) (1). The appearance of the third generation of the cellular network services make mobile communication an advantage for M-learning (2). M-learning is becoming popular because it facilitates education (3) with the ease of dissemination of the learning contents (4) and ability to access to the course content all the time and everywhere (5).

Theory of Reasoned Action "TRA" referred to behavioral intention (BI) as a measure of the strength

of one's intention to practice information technology. Technology Acceptance Model "TAM" is another theory used for behavioral prediction. It describes the adoption behavior of new technology. TAM clarifies the relations between beliefs regarding the usefulness and ease of use at one side and the customers' attitudes, intentions, and actual usage at the other side. Perceived usefulness (PU) and perceived ease of use (EOU) are independent variables, while the dependent variable is the BI and the individual's attitude is the mediating variable (6).

As of now, there are around 6 billion individuals own cell phones at all ages of life down to children 3 years old (7). About 79% of Americans and 90% of European and Asian teens are using cell phones (8, 9). The sales of cell phones are quickly increasing in Malaysia since 2014 with expected chance for more future growth (10). Recent study confirmed that cell phone usage is affecting the university students' academic performance (11).

Many other types of research had studied M-learning from technical point of view (12 – 14), but few sporadic researches had studied M-learning from a customer’s perspective. Success or non-success of M-learning practice depends on many factors. The human factors need more detailed studies to guarantee successful application of M-learning. Student’s readiness to practice the M-learning will be studied in this research through the application of TRA and TAM.

MATERIALS AND METHODS

This is a cross sectional study among medical students in Management and Science university (MSU), Malaysia. The studied sample was randomly collected from medical students at different grades in MBBS (Medicine Bachelor and Bachelor surgery) and BMS (Bachelor Medical Science) programs. A M-learning adoption questionnaire was retrieved from previous study (2) based on TRA (15) and TAM (16).

The Questionnaire forms were distributed electronically through a google form and 129 responses were received. The concept of M-learning was explained to the respondents in the introduction part of the questionnaire. Section I included items to collect demographic information. In section II, 19 items were provided, referring to the following dimensions: perceived usefulness (PU) of M-learning (items 11,12,13,20), ease of use (EOU) of M-learning (items 7,8,9,15), availability of resources (R) to use M-learning (items 10,14,16,17), behavioral intention (BI) to adopt M-learning (items 22,23,24,25), and attitude (A) towards mobile learning (items 18,19,21). The opinions of the respondents were rated using 5-point Likert scales.

Analysis of the data was processed by the Statistical Package for Social Science IBM (SPSS25). The descriptive statistics are used in presenting the result of study. Chi-Square is used for analyzing the relationships between 2 variables and a factor analysis is used for grouping the results for each category. The factor analysis had a varimax rotation method.

RESULTS

The social characteristics of the participants are tabulated (Table I) showing that most of them are males (74.6%), mostly from the MBBS program (85%). The largest group of students within the sample were in their fourth year, being around 28.3%, followed by those in their fifth year at around 26.8%. A large majority of the respondents (82.7%) have previous experience with M-learning and 41.7% of them prefer using M-learning for assessments only and 22.8% prefer using it in teaching and learning only while 35.5% thought that it can be used for both teaching and assessment.

Responses of the participants were studied according to

Table I : Socio-demographic data of the participants

Item	Response	
Gender	Male	74.6%
	Female	25.4%
Program	MBBS	85%
	BMS	15%
Level of study	Year 1	7.1 %
	Year 2	18.1 %
	Year 3	19.7 %
	Year 4	28.3 %
	Year 5	26.8 %
Have you ever practiced of M-Learning?	Yes	82.7%
	No	17.3%
What is the best use of M-Learning?	Teaching only	22.8 %
	Assessment only	41.7%
	Both teaching and assessment	35.5 %

the TAM and showed that regarding their PU, 19.5% of them strongly agreed that M-Learning improves the communication between students and lecturers, 32.3% of them strongly agreed that M-Learning provides a quick feed back in learning, 30.5% of them strongly agreed that M-Learning narrows the distance between Malaysia and developed nations. Regarding the EOU, 23.3% of the respondents strongly agreed that M-Learning is easy to use, 27.6% strongly agreed that M-Learning techniques are clear and understandable, 18% strongly agreed that M-Learning requires no mental effort and only 7.1% strongly agreed that it may be difficult to download Apps. Regarding the availability of resources for M-Learning, 46.1% of the respondents strongly agreed that M-Learning can be practiced anywhere, any time, 23% strongly agreed that their faculty had the technology needed for M-Learning while others stated that they cannot use it because of the expenses involve (7.8%) or because of the poor network in their staying place (18%) (Table II).

The respondents’ attitude toward M-Learning was mostly positive (56.7% agreed and 18.1% strongly agreed) and minority of them had a negative attitude (0.8% strongly disagreed and 3.9% disagreed). Moreover, most of them have the intention to use M-Learning (62.2% agreed and 22% strongly agreed) (Table III).

The applications used for M-learning by the respondents in this study include Kahoot (92.8%), Quizlet (63.2%), Quizziz (62.4%), Edmodo (48%), Socrative (45.6%) and google classroom (36%) (Figure 1).

Kaiser-Meyer-Olkin (KMO) test is used to measure the sampling adequacy (values > 0.5 indicate the sampling is adequate) (figure 2). Figure (3) is showing the relation between respondents’ intention to adopt M-learning (item 24) and the studied variables (R “item 17”, A “item 21”, EOU “item 7”, and U “item 13”). H_0 : R “item 17”, A “item 21”, EOU “item 7”, and PU “item 13” and BI

Table II : Responses of the participants regarding the Perceived usefulness (PU), Ease of use (EOU) and availability of resources for M-Learning

	Item	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Perceived usefulness (PU)	11) Improves the communication between students and lecturers	19.5	37.5	27.3	11.7	3.9
	12) Provides a quick feed back in learning	32.3	50.3	13.4	2.4	1.6
	13) Allows creating and sharing useful learning material.	30.5	50.8	14.8	3.1	0.8
	20) Narrows the distance between Malaysia and developed nations.	23.4	50.8	20.3	3.9	1.6
Ease of use (EOU)	7) Easy to use	23.3	46.5	16.5	3.9	0.8
	8) Techniques are clear and understandable.	27.6	44.1	22	2.4	3.9
	9) Requires no mental effort	18	32.8	34.4	10.9	3.9
Availability of resources	15) Difficult to download from the App. Store.	7.1	7.1	25.4	42.9	17.5
	10) M-Learning can be practiced anywhere, any time.	46.1	40.6	10.9	1.6	0.8
	14) My faculty had the technology needed for M-Learning.	23	44.4	23	7.1	2.4
	16) I can not use because of the expenses involved	7.8	10.9	21.1	40.6	19.5
	17) I can not use because of poor network in my staying place	18	19.5	33.6	23.4	5.5

Table III : Responses of the participants regarding their attitude and intention to use M-Learning

	Item	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Behavioral Intention (BI)	22) intend to use when it is available	22	62.2	11.8	3.1	0.8
	23) I intend to say something favor it	22.2	56.3	15.1	5.6	0.8
	24) I intend to use smart phone to follow lectures' note.	28.1	50	14.1	6.3	1.6
	25) I intend to advise my friends to use it	18.8	46.9	21.9	10.2	2.3
	Attitude (A)	18) it is very desirable to use	17.5	53.2	24.6	4
	19) I hold positive evaluation of M-Learning.	18.1	56.7	20.5	3.9	0.8
	21) I am not in favor of M-Learning	7	11.7	18.8	51.6	10.9

what is/are application (s) you used in M-learning?

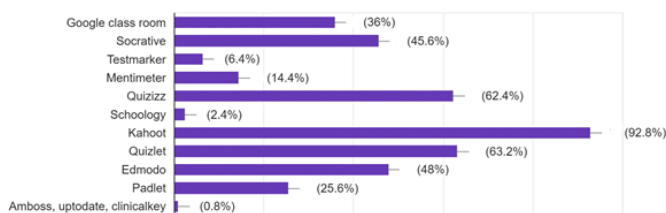


Figure 1 : The applications used by the respondents in M-Learning

“item 24” are independent of each other. H_1 : R “item 17”, A “item 21”, EOU “item 7”, and U “item 13” and BI “item 24” are dependent on each other. $\alpha = 0.05$. Since the p-value (0.006, 0.000, 0.000, and 0.000 respectively) is smaller than $\alpha = (0.05)$, the null is rejected and it is concluded that it is 95% confident that there is significant evidence for the dependent relationship between the studied variables (R, A, EOU, and U) and the study respondents’ intention to practice M- learning.

DISCUSSION

M-learning is considered a subcategory of electronic learning (E-learning) (17) but M-learning is more

Attitude Kaiser-Meyer-Olkin Measure of Sampling Adequacy .569 Bartlett's Test of Sphericity Approx. Chi-Square 58.420 df 6 Sig. .000	Usefulness Kaiser-Meyer-Olkin Measure of Sampling Adequacy .752* Bartlett's Test of Sphericity Approx. Chi-Square 130.128 df 6 Sig. .000
availability of resources Kaiser-Meyer-Olkin Measure of Sampling Adequacy .526 Bartlett's Test of Sphericity Approx. Chi-Square 89.520 df 6 Sig. .000	the ease of use Kaiser-Meyer-Olkin Measure of Sampling Adequacy .550 Bartlett's Test of Sphericity Approx. Chi-Square 193.660 df 6 Sig. .000
Intention Kaiser-Meyer-Olkin Measure of Sampling Adequacy .801* Bartlett's Test of Sphericity Approx. Chi-Square 314.156 df 6 Sig. .000	

Figure 2 : Kaiser-Meyer-Olkin (KMO) test for sample adequacy for each variant

personal, informal, situated, content specific, and portable. While e-learning is more structured, media-rich, and interactive (18). The rapid advancement of technology has increased the usefulness of mobile communication devices in the contemporary world. This research is done to explore the attitude of medical students towards M-Learning by studying the factors that may affect the intentions of the Malaysian medical students to practice this type of learning.

Availability of resources				Attitude			
	Value	df	Asymptotic Significance (2-sided)		Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.881*	16	.006	Pearson Chi-Square	73.933*	16	.000
Likelihood Ratio	38.166	16	.001	Likelihood Ratio	67.222	16	.000
Linear-by-Linear Association	480	1	.488	Linear-by-Linear Association	9.381	1	.002
N of Valid Cases	128			N of Valid Cases	128		

Ease of use				Usefulness			
	Value	df	Asymptotic Significance (2-sided)		Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	99.740*	16	.000	Pearson Chi-Square	153.467*	16	.000
Likelihood Ratio	60.514	16	.000	Likelihood Ratio	81.223	16	.000
Linear-by-Linear Association	22.745	1	.000	Linear-by-Linear Association	37.528	1	.000
N of Valid Cases	127			N of Valid Cases	128		

Figure 3 : The relation between intention to use M- Learning and the studied variables

Acceptance of information technology is explained in the TAM (19). TAM is studying the strength of belief that using a system can enhance the performance (perceived usefulness “PU”) and the extent of belief that using this system will be easy (perceived ease of use “EOU”) as primary factors for reasoning the acceptance of any technology (20). PU and EOU represent the external factors affecting the intention of technology adoption. The use is determined by the intention to adoption. Intention depends on the attitude toward using it. Attitude is determined by PU and EOU (21). Results of this research showed that students can have a greater intention to practice M-Learning when have greater PU, EOU as well as the availability of resources.

Results of the current sample showed that 82.7% of students were already using M-Learning. However, it should be highlighted that using a mobile device, does not guarantee the students accept its use in learning (22) but the students must be aware of the usefulness of M-learning. In fact the students are still not fully recognizing the benefits of M-learning (23). Another study concluded that the students should see the benefits to be ready for using this educational technology (24). Results of this research showed that students’ intention to practice M-Learning is significantly affected by the PU.

Adult learners’ intention is influenced by their attitude that is guided by their needs; cognitive, affective and social needs (25). Many needs can be achieved by M-learning, such as communication among the students, access to the learning content and support to students everywhere (26).

Most of respondents in this research (30.5% strongly agreed and 50.8% agreed) confirmed that M-Learning help in creating and sharing useful learning material. A previous study highlighted this issue and stated that interaction encourages exchange information, knowledge and ideas among learners (27). Moreover, interaction can be among students or students-teacher interaction or student-content interaction (28). During M-learning, students can practice fun activities with education that may be called edutainment tools e.g.,

E-book, E-drawing, gamification ... etc. This helps to alleviate the pressures of studying and makes education fun. Also, M-learning supports situated learning; students use their mobile phones to capture the study materials and share them with colleagues and lecturers. This means that the learners are taking an active role in education, through scheduling, monitoring, and assessing their own learning (29, 30). However, some respondents in this research considered this issue as a distractor associated with M-learning.

M-learning encourages the self-management of learning and raises the sense of responsibility. The students are the most important element in the learning process and so they can manage their learning (31).

Many mobile applications can be used for M-learning. Most of the respondents in this study are using Kahoot, Quizziz and Quizlet with less usage of Edmodo and Padlet. This may explain the current results that showed that 41.7% of the respondents are using it for assessment, 22.8% are using it for learning and 35.5% are using it for both.

Although mobile technology is a growing popularity in Malaysia according to Malaysian Communications and Multimedia Commission (32), researches are still considering M-learning to be just starting in Malaysia (33 – 35). Limitation of M-learning implementation in university students in Malaysia has many causes e.g., financial, pedagogical and technological issues (34) beside policy constraint (36). Other factors that were detected in this research include; the need for clinical practice and human interaction in the medical study that may put some challenges for M-learning among medical students.

CONCLUSION

This research showed that students’ intention to practice M-Learning among medical students is significantly dependent on the students’ awareness of its usefulness with the availability of resources and ease of use beside the students’ attitude. Although most of the studied sample of the medical students are already using M-learning, they expressed some limitations to M-learning implementation in medical study due to the need for clinical practice and human interaction.

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REFERENCES

1. Chmiliar, L. Mobile Learning - Student Perspectives. In J. Sanchez & K. Zhang (Eds.), Proceedings of World Conference on E-Learning in Corporate,

- Government, Healthcare, and Higher Education, Chesapeake, VA: AACE, 2010. pp. 1646-1651.
2. Attalla S M., El sherbiny R M., Mokbel W A., Elmoursy R M. and Abdel-Wahab A G. Screening of Students' Intentions to Adopt Mobile - Learning: A Case from Egypt. *The International Journal of Online Pedagogy and Course Design (IJOPCD)*, 2012, 2 (1): 65-82. <http://services.igi-global.com/resolvedoi/resolve...18/ijopcd.2012010105>
 3. Mahamad S., Ibrahim M.N., Foad M.I.A.M. and Taib S.M. Open source implementation of m-learning for primary schools in Malaysia. *International Journal of Social Sciences*, 2008, 3 (4): 309-313.
 4. Lim T., Fadzil M. and Mansor N. Mobile Learning via SMS at Open University Malaysia: Equitable, Effective, and Sustainable. *International Review of Research in Open and Distance Learning*, 2011, 12 (2): 122-137.
 5. Clyde, L.A. M-learning. *Teacher Librarian*, 2004, 32(1): 45-56.
 6. Abdel-Wahab, A.G. Modeling managers' intentions to adopt telecommuting in a developing country: A case from Egypt. *The Electronic Journal of Communication*, 2008, 18 (1). <http://www.cios.org/EJCPUBLIC/018/1/01815.HTML>
 7. Ranjitha, G.E., Austin, R.D., Ramasamy, S., Bharathi, C.S., Angeline, D., and Sambasivam, S. Influence of handheld mobiles on parotid: A cohort study. *J Indian Acad Oral Med Radiol*. 2017, 29: 254-8.
 8. Goldwein, O. and Aframian, D.J. The influence of handheld mobile phones on human parotid gland secretion. *Oral Diseases*. 2009, 16 (2):146-50.
 9. Taghavi-Zonuz, A., Jamali, Z., Pourzare-Mehrban, S., Rahbar, M., and Tamgaji, R. Effect of mobile phone waves and wi-fi on electrolytes and oxidative stress indices of saliva. *World Journal of Dentistry*. 2017, 8 (5) :370-373.
 10. Hong, Y.H., Teh, B.H., and Soh, C.H. Acceptance of smart phone by younger consumers in Malaysia. *Asian Social Science*, 2014, 10 (6).
 11. Attalla S.M. and Safiee N. Study the pattern of cell phone usage associated with side effects among university students: case study in a Malaysian university. Presented at National Forensic Science Symposium (NFSS) 2019 organized by the Forensic Science Society Malaysia (FSSM) at Pullman hotel Bangsar, Kuala Lumpur, Malaysia at 25th July 2019.
 12. Chang, C.Y.; Sheu, J. P. and Chan, T.W. Concept and design of ad hoc and mobile classroom, *Journal of Computer Assisted Learning*, 2003, 19 (3): 336 - 346.
 13. Chen, Y.S., Kao, T.C. and Sheu, J.P. A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning*, 2003, 19 (3): 347-59.
 14. Liu, T.C., Wang, H.Y., Liang, J.K., Chan, T.W., Ko, H.W. and Yang, J.C. (2003). Wireless and mobile technologies to enhance teaching and learning. *Journal of Computer Assisted Learning*, 2003, 19 (3): 371-382.
 15. Fishbein, M. and Azjen, I. *Belief, attitude, intentions, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley .1975.
 16. Davis F. D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 1989, 319-340.
 17. Peters, K. M-learning: Positioning Educators for a Mobile Connected Future. In: Mohamed Ally. *Mobile Learning: Transforming the Delivery of Education and Training*, Canada: AU Press.2009.
 18. Traxler, J. Current state of mobile learning. In: Mohamed Ally (ed.). *Mobile Learning: Transforming the Delivery of Education and Training*, Canada: AU Press. 2007
 19. Lee Y., Kozar K. A. and Larsen K. R. The technology acceptance model: Past, present, and future", *Communications of the Association for information systems*, 2003, 12:50
 20. Davis F. D., Bagozzi R. P., Warshaw P. R. User acceptance of computer technology: a comparison of two theoretical models", *Management science*, 1989, 35:982-1003
 21. Adams D. A., Nelson R. R. and Todd P. A. Perceived usefulness, ease of use, and usage of information technology: a replication. *MIS quarterly*, 1992, 227-247
 22. Corbeil J. R. and Valdes-Corbeil M. E. Are You Ready for Mobile Learning?. *Educause Quarterly*, 2007, 3(2)
 23. Percival J. and Percival N. Engineering Students' Perceptions of Mobile Learning, In *Proceedings of the World Congress on Engineering and Computer Science (WCECS 2008)*, October 22 - 24,
 24. Ismail I., Azizan S. and Gunasegaran T. Mobile Learning in Malaysian Universities: Are Students Ready? *IJIM*, 2016, 10 (3): 17 – 23. <http://dx.doi.org/10.3991/ijim.v10i3.5316>.
 25. Hashim K. F., Tan F. B. and Rashid A. Adult learners' intention to adopt mobile learning: A motivational perspective. *BJET*, 2015, 24 (2): 381 – 390. doi.org/10.1111/bjet.12148
 26. Gregson, J. and Jordon, D. Exploring the Challenges and Opportunities of M-learning Within an International Distance Education Programme. In: Mohamed Ally (Ed.). *Mobile Learning: Transforming the Delivery of Education and Training*, Canada: AU Press. 2009.
 27. Kue Y.C., Walker A. E., Schroder K. E. and Belland B. R. Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses", *The Internet and Higher Education*, 2014, 20:35-50
 28. Alshalabi I.A. and Elleithy K. Effective m-learning design Strategies for computer science and

- Engineering courses", *International Journal of Mobile Network Communications & Telematics (IJMNCT)*, 2012, 2 (1): 1-11.
29. Selfe C. L. *Technology and literacy in the 21st century: The importance of paying attention*: SIU Press. 1999.
30. Watts N. *A Learner-based approach to computer mediated language learning*", *System*, 1997, 25 :1-8
31. Ali R. A. and Mohd Arshad M.R. *Perspectives of Students' Behavior Towards Mobile Learning (M-learning) in Egypt: an Extension of the UTAUT Model*. *Engineering, Technology & Applied Science Research*, 2016, (4):1109-1114
32. *Malaysian Communications and Multimedia*, available at http://www.skmm.gov.my/link_file/facts_figures/stats/pdf/Handphone_Users_Survey_2008.pdf
33. Ismail I., Bokhare S. F., Azizan S. N., and Azman N. *Teaching via mobile phone: A case study on Malaysian teachers' technology acceptance and readiness*", *Journal of Educators Online*, 2013, 10(1):1-38
34. Embi M. A. and Nordin N. M. *Mobile learning: Malaysian initiatives and research findings*, 2013. Available at http://www.mohe.gov.my/portal/images/penerbitan/JPT/Pengurusan_Pembangunan_Akademik/Mobile_Learning_Malaysian_Initiatives_and_Research_Findings.pdf
35. Mohamad M., Woollard J. *Bringing change in secondary schools: can mobile learning via mobile phones be implemented in Malaysia?*. Paper presented at the 4th International Malaysian Educational Technology Convention, Kuala Lumpur, Malaysia, 2010.
36. Sa'don N.F., Dahlan H. M., and Ibrahim A. *Usage of mobile Learning in Malaysian secondary education: Stakeholders' view*. *Journal of Information Systems Research and Innovation*, 2014, 6:42-50