Digital Information Evaluation Skills among Students in Higher Education

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Abstract – *Despite of the advancement of technology in the present internet age, many college students lack the information and communication technology (ICT) literacy skills like evaluating those necessary to navigate, as well as using the information available today. Evaluating the quality of information sources encompasses students' ability to determine relevance, accuracy, and overall credibility of sources and information. Moreover, the quality of information found online is extremely variable because anyone can post data on the internet, and not all online sources are equally reliable, valuable, or accurate. From a study conducted on diploma students' assignments using rubric at an international university in Kuala Lumpur, it was found that there was a problem in digital information evaluation skills and lack of ability in using evaluation criteria, including authority, accuracy, currency, objectivity, and coverage on digital information, as well as sources among diploma students. The future work of this study will be the use of mobile devices in collaborative and interactive learning to improve digital information evaluation skills among diploma students. This approach does not only improve the students' learning attitude, but also enhances the effectiveness of learning.* **Copyright © 2015 Penerbit Akademia Baru - All rights reserved.**

Keywords: Information literacy, Digital information, Online information evaluation skills Mobile application

1.0 INTRODUCTION

Digital information is the information gathered from the Internet sources. Information literacy is a set of abilities that requires individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively" [1]. Hence, lack of information literacy, or what we term as 'information illiteracy', has led to 'development trap', where societies and nations continue in the cycle of poverty and under-development [2, 3]. Besides, librarians and faculty members in the higher education have agreed that the ability to find, access, evaluate, and use information in effective and ethical ways are important abilities for students' success in their educational learning programs and also for their lifelong learning. In general, information literacy is not only important for college students, but also for everyone and every person in the world today at every level [4]. Information literacy studies in the engineering education literature fall primarily into four categories: information gathering, information evaluation, information application, and information documentation, which are essential for engineering students to be independent researchers in the workplace [5, 6].

Based on the suggestions from previous studies, students are proficient at locating information, but often have difficulty in understanding citations, as well as synthesizing and evaluating information [7-9]. Previous studies found that librarians should pay more time on evaluation information and information sources as students largely lack the competencies associated with information literacy, especially the skills associated with information evaluation [4, 9]. Another researcher reported that documenting and citing resources had been more confidently done by students than finding and evaluating information [10].

Nevertheless, the problematic issue is the 'cut-and-paste' behaviour among students when searching the Internet for information to complete their assignments without giving any attention to the reliability of the information and sources, so lecturers have agreed that instruction in evaluating information found on the Internet and using different criteria to evaluate web information is necessary for students [11, 12]. In addition, the results of a study indicated that students had quick and easy behaviour when seeking information without adequate searching and evaluating skills [13].

Moreover, despite of the frequent use of the world wide web (www), a study conducted by Walraven et al. noted that students' evaluation methods were far from ideal because they did not use the evaluation criteria in their search results, the sources, and the information they found on the Internet [14]. The students' abilities to locate, evaluate, and apply high quality information had been terribly weak in solving open-ended problems in their courses [15]. Furthermore, in web searching process students have more attention to surface markers, including the currency, the author, and the type of language used, instead of evaluating sites for credibility and accuracy [14, 16].

Students also have challenging issues in recognizing the credibility of websites, such as recognizing affiliations and expertise in sources of evidence [17]. Besides, most students lack the skills concerning understanding a text, evaluating trustworthiness and relevance of a piece of information, as well as adapting one's strategy to the search process results [11].

In addition, the review of literatures indicated that convenience is the first priority of students in selecting digital information and sources over other evaluation criteria, which can result in lack of quality learning [5, 16]. Based on a review of the literature and a preliminary survey on practicing engineers, it was found that a strong focus should be placed on evaluating information [18]. Overall, researches on students' information evaluation skills portrayed general weakness of students' abilities in critical evaluation of information and sources [5, 19, 20]. In order to prepare information literate students for the digital age, it is vital to integrate information literacy into the curriculum [21].

Unfortunately, instruction for information skills is still ineffective even though the importance of instruction in an effective and critical use of the www has been recognized a few years ago [22]. Educators should provide university students with more training pertaining to evaluating online information and instruct them to be critical learners [23]. As depicted in other researches, instructors can help to improve the students' evaluation skills via explicit guidance while implementing online searching activities [24].

Moreover, the findings obtained from other studies highlighted an essential need to educate, promote, articulate, and implement the criteria for evaluating both information and resources, as well as synthesizing information to construct new concepts [25, 26]. Based on a previous study, students were found to be more confident in documenting and citing references, but faced problems concerning information gathering, and then, evaluating [6]. Another study

found that students seriously lacked the necessary knowledge and skills to evaluate the Internet information, identify the most efficient search strategy, use scholarly resources, and use information ethically [27].

Another researcher expressed that large-scale lectures suffer from lack of interaction among learners, as well as among learners and lecturers. Moreover, collaborative learning is not feasible in the traditional large-scale lectures, where learners are single learners. The results of this decreasing interaction and collaboration are often deficient learning outcomes and unsatisfied learners [28]. Nevertheless, the use of IT and mobile devices provides potential for improving the interaction from lectures via transferring interactive data between students and instructors in real-time [29]. Besides, mobile learning promotes active learning, encourage the contribution of shy students, promote classroom accountability, and encourage student interaction [30]. Other than that, collaborative mobile-learning provides the ability of communication for learners to complete tasks and activities towards learning objectives [31].

Interactive learning is the statement of learning that happens through interrelation between humans and their reciprocal actions. An interactive setting in the learning-teaching-environment can enhance students' motivation, attention, and participation in class, as well as foster greater students' exchange of knowledge [32, 33]. Collaborative learning is the statement of learning that participants talk together and the outcome is negotiated by group. The collaborative learning models can be effectively used in information literacy teaching and in information resources evaluation because collaborative learning provides learners with more effective learning opportunities [34].

The long-term future direction of this study is to develop a suitable cooperative function for students to team up with peers [35]. The learning performance may be disappointing if such devices are used for situated learning without the support of appropriate learning strategies and instructor guidance [36]. While many recent studies focusing on m-learning and u-learning environments show that it is possible to achieve genuinely personalized learning using such approaches [37, 38], few works have explored the use of cooperative learning activities in such environments [36]. Therefore, this study proposed a jigsaw-based cooperative learning strategy with mobile learning to support cooperative learning through mobile application, and thus, overcome the restrictions of traditional m-learning.

2.0 PROBLEM STATEMENT

Although the importance of effective and critical use of the world wide web (www) has been recognized since several years in Malaysia, based on the findings from interviews with lecturers and the scoring rubric conducted on students' assignments at an international university in Kuala Lumpur, the students did not examine or compared information from various sources in order to evaluate reliability, accuracy, authority, currency, coverage, and point of view or bias.

From previous studies, it was found that most students did not articulate and apply initial criteria for evaluating both the digital information and its sources [5, 6, 10, 11] . The findings from interviews with twelve lecturers of diploma students at an international university in Kuala Lumpur indicated that the students used convenience as the primary and most used criterion to select online information rather than other evaluation criteria. Lecturers confirmed that students often have trouble in evaluating and synthesizing online-information because they often cut and paste the online-information without evaluating the information and sources

based on the evaluation criteria. Lecturers also agreed that instruction in evaluating digital information is needed for students as students need support to use different criteria to evaluate web information. Moreover, the lecturers strongly agreed that instruction in digital information evaluation skills (DIES) is rare, so integrating this evaluation skill throughout the curriculum is essential to increase the quality of learning. The lack of guideline and centralized control on what is shared on the www have caused the contents to be easily altered, and so evaluating what one has found on the www is crucial [39].

Consequently, using the evaluation criteria for selecting information and sources can help to avoid using false, incomplete, and biased information [11]. Thus, a study that develops a mobile-learning application that enables collaboration and interaction between students and lecturers by quasi experimental design using pre- and post-test assessments with diploma students should provide an empirical basis for improvement strategies to increase DIES.

3.0 RELATED WORK

The findings from previous studies indicated that students lack discrimination and evaluation of sources concerning internet searching in completing their assignments. The intervention of the study to eliminate the students' lack of evaluation skills was to interview a nationwide sample of teaching faculty in six disciplines for their perspectives on the importance of information literacy competencies for their students. The researcher recommended to advance the discourse of information literacy further into the disciplines, and besides, both faculty and librarians should value the competencies with information literacy [4].

Meanwhile, another study that reviewed the literature and carried out a preliminary survey among practicing engineers indicated that engineers' ability in evaluating information for quality and reliability had been low. The respondents claimed that a strong focus during information literacy training should be placed on evaluating information. Waters et al recommended that the continued collaboration and discussion between librarians would better equip in helping bridge the gap and the transition of the students from university to workplace. In addition, more emphasis during information literacy training should be placed on finding grey literature and a strong focus should be placed on evaluating information [18].

In addition, the results obtained from a research that employed content analysis with a random sample of 40 memos specified that students used convenience as the primary criterion to select information over other criteria, such as source credibility, reputation or bias. Besides, Wertz et al. [5] developed a structured coding protocol and suggested a need of curricula for helping students to develop appropriate strategies to access, as well as to evaluate digital information [5].

Furthermore, another study found that most students lacked the skills to successfully assess trustworthy and relevant piece of information. Meanwhile, Walraven et al [11] designed and tested a program for teaching 9th graders course content and how they should evaluate information found on the www. The intervention of the program improved students' evaluation behaviour, but it did not achieve a transfer effect with regards to the use of criteria for the evaluation of websites and search results in workplace. Walraven et al [11] also recommended that integrating evaluation skills throughout the curriculum is essential to foster transfer and prepare students for lifelong learning, besides teaching teachers on how to evaluate and how they can support their students to become critical web searchers.

The interactive and collaborative setting in the learning environment can enhance students' motivation and foster greater students' discussion [32, 33]. Mobile connectivity provides learners with the opportunities to discuss content with classmates and their lecturers, collaborate, as well as create new meaning and understanding [40]. In addition, having a collaborative and interactive learning framework of information evaluation skills through mobile application also will help in providing a more systematic integration of these skills into the curriculum.

Table 1: Summary of Related Work

| Ref.	Methodology /Intervention	Findings	Recommendations
[10]	An online survey with a sample size of freshman engineering students.	Students expressed less confidence in their ability to evaluate information than in other concepts probed, while they reported documenting and citing sources as one of their most highly rated skills.	1. Care should be taken to include information literacy instruction, which addresses that part of the information gathering cycle and information evaluation skills 2. A more holistic approach to information evaluation is still warranted.
[4]	Surveying and interviewing a nationwide sample of teaching faculty in six disciplines for their perspectives on the importance and the relevance of information literacy competencies for their students.	1. Interviewees were concerned with students' lack of discrimination and evaluation of sources. 2. Knowledge of and familiarity with information literacy standards are more closely associated with whether the faculty addresses information literacy in their courses.	1. Help to advance the discourse of information literacy further into the disciplines. 2. Faculty and librarians both value the competencies with information literacy, but further discussion is necessary to develop a more systematic integration of these competencies into the curriculum.
[18]	A review of the literature and a preliminary survey on practicing engineers	1. Lack of ability to evaluate information for quality and reliability. 2. A strong focus during information literacy training should be placed on evaluating information.	With continued collaboration and discussion, librarians will be better equipped to help bridge the gap and transition the students from university to workplace.
[5]	1. Employed content analysis with a	The overall research indicated that students used convenience as	Suggested a need of curricula for helping

	random sample of 40 memos 2. A structured coding protocol developed for this study.	the primary criterion to select information over other content- and context-based criteria, such as source credibility, reputation, or bias.	students develop appropriate strategies to access and evaluate information.
[11]	A program for teaching 9th graders course content (history) and how they should evaluate information found on the www was designed and tested.	1. Most students lacked the skills to successfully assess trustworthy and relevant piece of information. 2. The program improved students' evaluation behaviour. 3. Instruction did not achieve a transfer effect with regard to the use of criteria for the evaluation of websites and search results in other studies and workplace.	1. Integrating evaluation skill throughout the curriculum is essential to foster transfer and prepare students for lifelong learning. 2. Teaching teachers how to evaluate and how they can support their students to become critical web searchers.

4.0 CONCEPTUAL FRAMEWORK

A framework was designed based on previous researches, collaborative learning model, and interactive learning theory. This model is an adoption of the jigsaw model of collaborative learning model based on sociocultural learning theories and interaction theory. The current framework was applied to information evaluation skills to demonstrate how collaborative and interactive learning approaches could improve internet-information evaluation skills among diploma students. Figure 1.1 depicts the conceptual framework employed in this study. The independent variable in this framework is mobile-learning application that could affect evaluation skills, whereas the dependent variable in this framework is the DIES levels.

5.0 METHODOLOGY

In order to carry out an in-depth analysis pertaining to the digital information evaluation skills of students, a study involving 102 diploma students' assignments had been conducted. The students' assignments were analysed by using an adopted scoring rubric of Oaklef in assessing digital information evaluation skills among students [41]. Table 2 shows the scoring rubric to assess the digital information evaluation skills. The researcher assessed the six evaluation criteria, including authority, reliability, currency, accuracy, objectivity, and coverage on students' assignments with the rating scale from missing, inadequate, developing, and accomplished. This rubric used a six-point scale that evaluated if a student was inadequate, developing or accomplished in a specific skill. It also included descriptive adjectives that helped to clarify the scope of the accomplishment level for each skill.
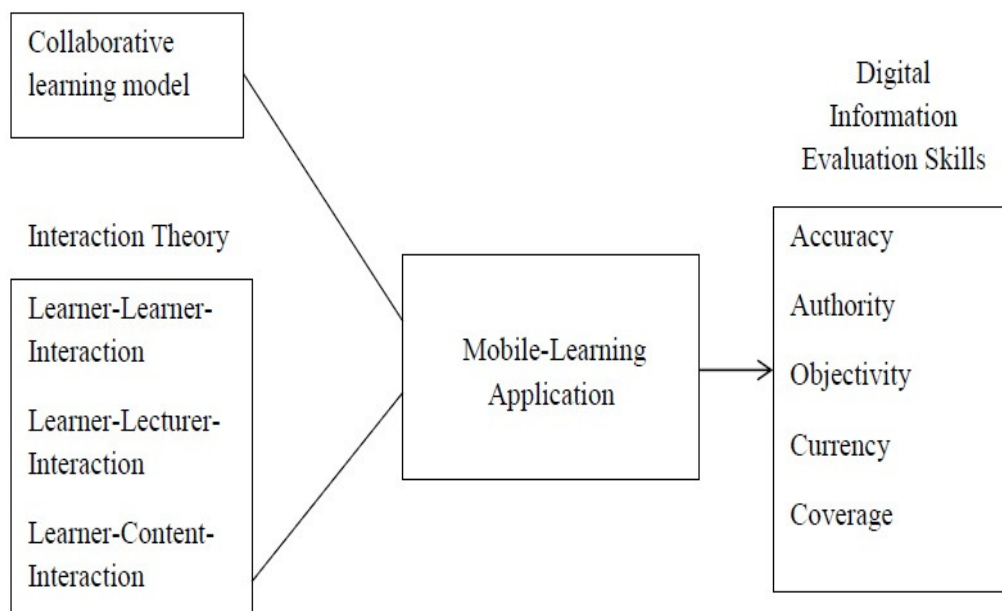
Figure1: Conceptual Framework

6.0 FINDINGS AND DISCUSSION

An initial interview with six lecturers of postgraduate (PhD and Master) students at an international university in Kuala Lumpur indicated that PhD and master students did not have any problem with the online information evaluation skills as they used the university online databases and also knew the appropriate use of Endnote in their studies.

The overall findings of the study by using the rubric depicted in Table 2 indicated that in average, 41% of the students were missing, 33% had been inadequate, 16% were developing, and less than 1% of the students accomplished in DIES, which concluded that most students lacked in DIES.

Table 2: Scoring Rubric to Assess Digital Information Evaluation Skills adopted from [41]

Criteria	Missing = 0	Inadequate = 1	Developing = 2	Accomplished = 3
Evaluates Authority		Student does not identify the author's credentials or qualifications.	Student briefly identifies the author's credentials and qualifications.	Student shows sufficient evidence of the author's credentials and qualifications.

	Students rated as Missing: 41%	Students rated as Inadequate: 50%	Students rated as Developing: 6%	Students rated as Accomplished: 0%
Evaluates Reliability		Student does not show evidence of whether or not the source is trustworthy.	Student shows superficial evidence of whether or not the source is trustworthy.	Student shows adequate evidence of whether or not the source is trustworthy.
	Students rated as Missing: 41%	Students rated as Inadequate: 28%	Students rated as Developing: 25%	Students rated as Accomplished: 0%
Evaluates currency		Student does not comment on the source's publication year and does not retrieve a source that is published in the last five years.	Student either comments on the source's publication year or retrieves a source that is published in the last five years, but does not do both.	Student comments on the source's publication year and retrieves the source that is published within the last five years.
	Students rated as Missing: 41%	Students rated as Inadequate: 32%	Students rated as Developing: 29%	Students rated as Accomplished: 3%
Criteria	Missing = 0	Inadequate = 1	Developing = 2	Accomplished = 3
Evaluates Accuracy		Student does not explain the accuracy of the source.	Student provides superficial explanation of the accuracy of the source.	Student provides a thorough explanation of the accuracy of the source.
	Students rated as Missing: 41%	Students rated as Inadequate: 50%	Students rated as Developing: 9%	Students rated as Accomplished: 0%
Evaluates		Student does not identify the	Student briefly identifies the	Student identifies the

Objectivity		author's point of view.	author's point of view.	author's point of view in detail.
	Students rated as Missing: 41%	Students rated as Inadequate: 56%	Students rated as Developing: 12%	Students rated as Accomplished: 0%
Evaluates Coverage		Student does not identify how the source contributes to his/ her knowledge.	Student identifies how the source contributes to his/her knowledge.	Student explains in detail how the source contributes to his/ her knowledge.
	Students rated as Missing: 41%	Students rated as Inadequate: 31%	Students rated as Developing: 26%	Students rated as Accomplished: 2%
Total	41%	33%	16%	1%

This research identified that students lacked the competencies associated with DIES because they did not examine and compare information from various sources in order to evaluate reliability, accuracy, authority, currency, coverage, and point of view or bias. This result is consistent with the findings obtained from a study conducted by Ross et al. that expressed the notion that engineering students were less confident in their ability to evaluate information. Besides, this research identified students' web searching competency level as low for overall, and this result is consistent with those from other previous studies [42, 43]. With the consistence to prior studies, the findings of this study revealed that students used convenience as the primary and most used criterion to select online information rather than other evaluation criteria [5].

Lecturers agreed that the instruction in evaluating digital information is needed for students as they need support to use different criteria to evaluate web information. Moreover, the lecturers strongly agreed that instruction in digital information evaluation skills is rare, so integrating this evaluation skill throughout the curriculum is essential to increase the quality of learning. It is, nevertheless, confirmed in other studies [21, 44-46] .

7.0 CONCLUSION AND FUTURE WORK

This study reviewed the information evaluation skills of students and conducted an adopted scoring rubric for assessing digital information evaluation skills among students. Hence, it had been concluded that students often have trouble in evaluating and synthesizing online-information from various sources in order to evaluate reliability, accuracy, authority, currency, coverage, and point of view or bias. Thus, a strong focus should be placed on evaluating information. Thus, it is recommended that educators should provide university students with more training on evaluating online information, besides instructing them to be critical learners. This is needed in future studies to integrate information evaluation skills using learning theories into the curriculum. The future work of this study will be the use of mobile devices in

collaborative and interactive mobile-learning to improve digital information evaluation skills among diploma students. This approach does not only improve the students' learning attitude, but it also enhances the effectiveness of learning.

REFERENCES

[1]   A.L. Association, Information literacy competency standards for higher education, 2000.

[2]   D.G. Dorner, G. Gorman, N.M. Gaston, Developing contextual perceptions of information literacy and information literacy education in the asian region, Library and Information Science 2 (2012) 151-172.

[3]   K. Ameen, G. Gorman, Information and digital literacy: a stumbling block to development?: A Pakistan perspective, Library Management 30 (2009) 99-112.

[4]   L. Saunders, Faculty perspectives on information literacy as a student learning outcome, The Journal of Academic Librarianship 38 (2012) 226-236.

[5]   R.E.H. Wertz, S. Purzer, M.J. Fosmire, M.E. Cardella, Assessing information literacy skills demonstrated in an engineering design task, Journal of Engineering Education 102 (2013) 577-602.

[6]   K.H. Hill, M.M. Best, A.P. Dalessio, Information literacy in the engineering technologies at the community college: A literature review, Community & Junior College Libraries 18 (2012) 151-167.

[7]   C.P. Brown, B. Kingsley-Wilson, Assessing organically: turning an assignment into an assessment, Reference Services Review 38 (2010) 536-556.

[8]   S. Rosenblatt, They can find it, but they don't know what to do with it: Describing the use of scholarly literature by undergraduate students, Journal of Information Literacy 4 (2010) 50-61.

[9]   A. Asher, L. Duke, D. Green, The ERIAL Project: Ethnographic research in Illinois academic libraries, Academic Commons, 2010. 13.

[10] M.C. Ross, M. Fosmire, R.E.H. Wertz, M.E. Cardella, S. Purzer, Lifelong learning and information literacy skills and the first year engineering undergraduate: Report of a self-assessment, American Society for Engineering Education, 2011.

[11] A. Walraven, S. Brand-Gruwel, H.P. Boshuizen, Fostering students' evaluation behaviour while searching the internet, Instructional Science 4 (2013) 125-146.

[12] D.J. Grimes, C.H. Boening, Worries with the Web: A look at student use of Web resources, College & Research Libraries 62 (2001) 11-22.

[13] P.D. Maughan, Assessing information literacy among undergraduates: A discussion of the literature and the University of California-Berkeley assessment experience, College & Research Libraries 62 (2001) 71-85.

[14] A. Walraven, S. Brand-Gruwel, H. Boshuizen, How students evaluate information and sources when searching the World Wide Web for information, Computers & Education 52 (2009) 234-246.

[15] A.S. Van Epps, R.E.H. Wertz, M.J. Fosmire, S. Purzer, Measuring student's ability to find and use high quality information: Developing standardized assessments. in Professional Communication Conference (IPCC), 2013 IEEE International, 2013.

[16] M.A. Britt, C. Aglinskas, Improving students' ability to identify and use source information, Cognition and Instruction 20 (2002) 485-522.

[17] C. Gormally, P. Brickman, M. Lutz, Developing a test of scientific literacy skills (TOSLS): measuring undergraduates' evaluation of scientific information and arguments, CBE-Life Sciences Education 11 (2012) 364-377.

[18] N. Waters, E. Kasuto, F. McNaughton, Partnership between engineering libraries: identifying information literacy skills for a successful transition from student to professional, Science & Technology Libraries 31 (2012) 124-132.

[19] K.-S. Kim, S.-C.J. Sin, Perception and selection of information sources by undergraduate students: effects of avoidant style, confidence, and personal control in problem-solving, The Journal of Academic Librarianship 33 (2007) 655-665.

[20] D. Scharf, N. Elliot, H.A. Huey, V. Briller, K. Joshi, Direct assessment of information literacy using writing portfolios, The Journal of Academic Librarianship 33 (2007) 462-477.

[21] M. Derakhshan, D. Singh, Integration of information literacy into the curriculum: a meta-synthesis, Library Review 60 (2011) 218-229.

[22] A. Walraven, S. Brand-Gruwel, H. Boshuizen, Information-problem solving: A review of problems students encounter and instructional solutions, Computers in Human Behavior 24 (2008) 623-648.

[23] X.L. Shen, C.M. Cheung, M.K. Lee, What leads students to adopt information from Wikipedia? An empirical investigation into the role of trust and information usefulness, British Journal of Educational Technology 44 (2013) 502-517.

[24] M.-J. Tsai, C.-Y. Hsu, C.-C. Tsai, Investigation of high school students' online science information searching performance: the role of implicit and explicit strategies, Journal of Science Education and Technology 21 (2012) 246-254.

[25] M. Lorenzen, The land of confusion?: High school students and their use of the World Wide Web for research, Research Strategies 18 (2001) 151-163.

[26] M.G.B. Quintana, M.C. Pujol, J.R. Romaní, Internet navigation and information search strategies: how do children are influenced by their participation in an intensive ICT project, International Journal of Technology and Design Education 22 (2012) 513-529.

[27] R. Ali, N. Abu-Hassan, M.Y.M. Daud, K. Jusoff, Information literacy skills of engineering students, International Journal of Research & Reviews in Applied Sciences 5 (2010) 264-270.

[28] K. Lehmann, M. Söllner. Theory-driven design of a mobile-learning application to support different interaction types in large-scale lectures. in Twenty Second European Conference on Information Systems, Tel Aviv, 2014.

[29] L.E. Dyson, A. Litchfield, R. Raban, Interactive classroom mLearning and the experiential transactions between students and lecturer, in: Proceedings ascilite Auckland, 2009, p. 233-242.

[30] C. Markett, I.A. Sanchez, S. Weber, B. Tangney, Using short message service to encourage interactivity in the classroom, Computers & Education 46 (2006) 280-293.

[31] J. Cheon, S. Lee, S.M. Crooks, J. Song, An investigation of mobile learning readiness in higher education based on the theory of planned behavior, Computers & Education 59 (2012) 1054-1064.

[32] Liu, T.-C., et al. Embedding educlick in classroom to enhance interaction. in Proceedings of international conference on computers in education (ICCE), 2003.

[33] R. Sims, Promises of interactivity: Aligning learner perceptions and expectations with strategies for flexible and online learning, Distance Education 24 (2003) 87-103.

[34] L. Wang, Sociocultural learning theories and information literacy teaching activities in higher education, Reference & User Services Quarterly 47 (2007) 149-158.

[35] K.-Y. Chin, Y.-L. Chen, A mobile learning support system for ubiquitous learning environments, Procedia-Social and Behavioral Sciences 73 (2013) 14-21.

[36] Y.-M. Huang, Y.-W. Liao, S.-H. Huang, H.-C. Chen, A Jigsaw-based Cooperative Learning Approach to Improve Learning Outcomes for Mobile Situated Learning, Educational Technology & Society 17 (2014) 128-140.

[37] C. Evans, The effectiveness of m-learning in the form of podcast revision lectures in higher education, Computers & Education 50 (2008) 491-498.

[38] H. Uzunboylu, N. Cavus, E. Ercag, Using mobile learning to increase environmental awareness, Computers & Education 52 (2009) 381-389.

[39] M.J. Metzger, A.J. Flanagin, L. Zwarun, College student Web use, perceptions of information credibility, and verification behavior, Computers & Education 41 (2003) 271-290.

[40] J. Gikas, M.M. Grant, Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media, The Internet and Higher Education 19 (2013) 18-26.

[41] M. Oakleaf, Staying on track with rubric assessment: Five institutions investigate information literacy learning, Peer Review 14 (2011) 19-21.

[42] M.J. Mahdian, S. Shahbazi, Barriers and challenges, taking advantage of new technologies in the field of information literacy from the perspective of faculty members, Procedia-Social and Behavioral Sciences 69 (2012) 2092-2095.

[43] R. Ding, F. Ma, Assessment of university student web searching competency by a task-based online test: A case study at Wuhan University, China. The Electronic Library 31 (2013) 359-375.

[44] V. Seiler, K. Miil, K. Lepik, How to fit teaching of information literacy in with students' needs: an on-line credit course model from the university of tartu library, Liber Quarterly 22 (2012) 42-63.

[45] N.B. Abdallah, Activity theory as a framework for understanding information literacy, Worldwide Commonalities and Challenges in Information Literacy Research and Practice, Springer, 2013, pp. 93-99.

[46] M. Kousar, K. Mahmood, Information Literacy Skills Assessment of Undergraduate Engineering Students, Worldwide Commonalities and Challenges in Information Literacy Research and Practice, Springer, 2013, pp. 471-477.