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## A framework for cooperative and interactive mobile learning to improve online information evaluation skills

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### ABSTRACT

The quality of online information is highly variable because anyone can post data on the internet, and not all online sources are equally reliable, valuable, or accurate. Previous studies reveal problems with online information evaluation skills and a lack of ability in using evaluation criteria, including currency, relevance, authority, accuracy and purpose. The primary purpose of this study is to develop a framework for cooperative and interactive mobile learning to improve students' online information evaluation skills. A mobile learning application is subsequently developed based on the proposed framework. To assess the effectiveness of the developed application, an experiment is conducted on diploma students in a university. A usability questionnaire is conducted on an experimental group to identify students' perceptions regarding the usability of the developed mobile application. The experimental results indicate that the application is significantly more effective with an effect size of 1.91 in improving students' online information evaluation skills than traditional learning. The results contribute to the extant literature in the context of mobile learning by identifying usability evaluation features and providing a framework for developing cooperative and interactive mobile learning. The implications of the present findings for research and instructional practice are discussed.

### 1. Introduction

According to the American Library Association's definition, information literacy (IL) means “having the ability to recognize when information is needed, then to be able to locate and evaluate the appropriate information and use it effectively” (Association, Chicago, Association, & Chicago, 1989). Online information is the information obtained through internet sources. Most students are proficient at locating information but often have difficulty with understanding citations, synthesizing and evaluating online information (Asher, Duke, & Green, 2010, p. 13; Brown & Kingsley-Wilson, 2010; Rosenblatt, 2010; Ross, Fosmire, Wertz, Cardella, & Purzer, 2011). Students are more confident in documenting and citing references but have more problems with information gathering and then evaluating (Hill, Best, & Dalessio, 2012). A portion of instructors may assume that IL instruction occurs in introductory courses, and may feel that it is not their responsibility to teach it themselves (Saunders, 2012). The overall research on students' information evaluation skills shows a general weakness in students' abilities to evaluate information and sources (Kim & Sin, 2007; Leeder, 2014; Scharf, Elliot, Huey, Briller, & Joshi, 2007; Walraven, Brand-Gruwel, & Boshuizen, 2013; Wertz, Purzer, Fosmire, & Cardella, 2013).

Previous studies suggested that librarians should give students more training on the skills required to evaluate online information

*Abbreviations:* OIES, Online information evaluation skills; CIMLA, Cooperative and interactive mobile learning application; IL, Information literacy

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and sources (Asher et al., 2010, p. 13; Saunders, 2012). Students' abilities to locate, evaluate and apply high quality information are not strong enough for them to solve open-ended problems in their courses (Van Epps, Fosmire, Wertz, & Purzer, 2013). Thus, integrating online information evaluation skills (OIES) into the curriculum is necessary to prepare students for the digital age and to instruct them in how to be critical learners. As few online tutorials has been made for information literacy at this time, it is necessary to develop some interactive components and activities for this field (Thornes, 2012).

Universities face an increasing number of students, which will lead to increasingly large lectures and decreasing interaction and cooperation, which are important factors for learning success and satisfaction (Lehmann & Söllner, 2014). In a large scale class a teacher is not able to handle learning activities and respond to students' questions and problems promptly, so students' satisfaction with learning will decrease. Teachers' failure to respond to students' problems in time has a negative effect on students' learning and satisfaction. The use of IT and mobile devices provides potential for improving the interaction in lectures via transferring interactive data between students and instructors in real-time (Dyson, Litchfield, Raban, & Tyler, 2009, pp. 233–242).

Mobile learning promotes active learning, encourages the contribution of shy students, promotes classroom accountability, and encourages student interaction (Markett, Sánchez, Weber, & Tangney, 2006). Mobile learning permits educators to generate online learning solutions for learners which can be used anywhere and anytime as necessary in order to attain results that cannot be attained with other existing educational models (Jou, Tennyson, Wang, & Huang, 2016). Cooperative mobile-learning provides learners the ability to communicate among themselves to complete tasks and activities towards achieving learning objectives (Cheon, Lee, Crooks, & Song, 2012).

Mobile learning is an intricate venture that requires well-designed learning methodologies in order to expand the learning achievements of students (Gedik, Hanci-Karademirci, Kursun, & Cagiltay, 2012; Hwang & Chang, 2011). While much recent research has focused on mobile learning environments, few studies have been conducted on the usage of cooperative learning in such environments (Huang, Liao, Huang, & Chen, 2014). In addition, there is a lack of mobile learning models and frameworks grounded in empirical research in the context of developing countries (Hsu & Ching, 2015). Reviews of previous studies including (Chang, Yan, & Tseng, 2012; Harrison, Flood, & Duce, 2013; Koole, 2009; Mohammadi, 2015; Ng & Nicholas, 2013; Ozdamli, 2012; S. Y.; Park, Nam, & Cha, 2012; Y.; Park, 2011) indicate a lack of frameworks for cooperative and interactive mobile learning. In addition, timeliness (response time) as an attribute of usability was not considered in any of the previous frameworks developed for mobile learning. Thus, it has become a challenging and important issue to develop mobile learning frameworks in the context of cooperative and interactive learning to improve students' online information evaluation skills.

To cope with this issue, this study proposes a framework for cooperative and interactive mobile learning. A mobile learning application was then developed based on the proposed framework to introduce Jigsaw-based cooperative and interactive learning approaches to mobile learning environment to increase interaction among peers by group cooperation. Moreover, this study included timeliness or interactive response time as a feature of usability to apply prior usability models in cooperative and interactive mobile learning context.

## 2. Literature review

### 2.1. Information evaluation criteria

Most students lack skills in evaluating information and sources (Walraven et al., 2013). Because of the importance of information literacy competency standards for higher education and according to the findings from previous study by Parsazadeh, Ali, and Saeed (2015) most undergraduate students lack the information evaluation skills to apply evaluation criteria on online information and sources. Thus, this study focuses on the third standard of information literacy competency standards to evaluate information and sources critically.

In the information literacy (IL) competency standards for higher education, there are five standards and twenty-two performance indicators. The third standard of IL predicates that, "The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system". In which one of the performance indicators is: "The information literate student articulates and applies initial criteria for evaluating both the information and its sources". Therefore, the outcome includes:

"examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias" (Association, 2000).

Based on the IL standard, there are five criteria that students should consider in credibility assessment of web-based information including currency, relevance, authority, accuracy and purpose. According to Metzger (2007) accuracy refers to the degree to which a Web site is free from errors, whether the information can be verified offline, and the reliability of the information on the site. The authority of a Web site may be assessed by noting who authored the site and whether contact information is provided for that person or organization, what the author's credentials, qualifications, and affiliations are, and whether the Web site is recommended by a trusted source. Purpose or bias involves identifying the purpose of the site and whether the information provided is fact or opinion. Currency or timeliness refers to whether the information is up to date. Relevance or validity refers to the comprehensiveness or depth of the information provided on the site (Metzger & Flanagan, 2013; Metzger, 2007).

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