

DIGITAL INFORMATION EVALUATION SKILLS AMONG STUDENTS IN HIGHER EDUCATION

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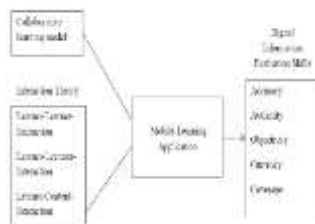
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Graphical abstract



Abstract

Despite the advancement of technology in the internet age, many college students lack the information and communication technology (ICT) literacy skills like evaluating which is necessary to navigate and using information available at present. Evaluating the quality of information sources encompasses students' ability to determine relevance, accuracy, and overall credibility of sources and information. 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, 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 and sources among diploma students had been discovered. 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.

Keywords: Information literacy, digital information, online information evaluation skills, mobile application.

Abstrak

Walaupun kemajuan teknologi di zaman internet pelajar kolej banyak kekurangan teknologi maklumat dan komunikasi (ICT) kemahiran literasi seperti menilai yang perlu untuk mengemudi dan menggunakan maklumat yang ada hari ini. Menilai kualiti sumber maklumat merangkumi keupayaan pelajar untuk menentukan kesesuaian, ketepatan, dan kredibiliti keseluruhan sumber dan maklumat. Kualiti maklumat yang didapati dalam talian adalah sangat berubah-ubah kerana sesiapa sahaja boleh menghantar data di internet, dan tidak semua dalam talian sumber sama-sama dipercayai, berharga, atau tepat. Daripada kajian yang dijalankan ke atas diploma tugas pelajar menggunakan rubrik di sebuah universiti antarabangsa di Kuala Lumpur ia dijumpai yang ada masalah dalam digital kemahiran penilaian maklumat dan kekurangan keupayaan dalam menggunakan kriteria penilaian termasuk kuasa, ketepatan, mata wang, objektif, dan liputan ke atas maklumat digital dan sumber di kalangan pelajar diploma. Kerja-kerja masa depan kajian ini akan menjadi penggunaan peranti mudah alih di pembelajaran kolaboratif dan interaktif untuk meningkatkan digital kemahiran penilaian maklumat pelajar diploma. Pendekatan ini bukan sahaja meningkatkan sikap pembelajaran pelajar, tetapi juga meningkatkan keberkesanan pembelajaran.

Kata kunci: Literasi maklumat, maklumat digital, maklumat dalam talian kemahiran penilaian, aplikasi mudah alih.

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1.0 INTRODUCTION

Digital information is the information that is gathered from the Internet sources. Information literacy is a set of abilities that require individuals to "recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively" [1]. Lack of information literacy, or what we term as 'information illiteracy', leads to the 'development trap', where societies and nations continue in the cycle of poverty and underdevelopment [2, 3]. In fact, librarians and faculty members in higher education agree 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 workplace [5, 6].

Based on the suggestions from previous studies, students are proficient at locating information, but often have difficulty in understanding citations, synthesizing, and evaluating information [7-9]. Previous studies found that librarians should pay more time on evaluating 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 are more confident for students than finding and evaluating information [10].

The problematic issue is the 'cut-and-paste' behavior of students when searching the Internet for information to complete their assignments without any attention to the reliability of the information and sources, so lecturers agree that instruction in evaluating information found on the Internet and using different criteria to evaluate web information is necessary for students [11, 12]. Meanwhile, the results of a study indicated that students have quick and easy behavior when seeking information without enough searching and evaluating skills [13].

Despite the frequent use of the World Wide Web (www), a previous study conducted by Walraven et al., (2009) noted that students' evaluation methods are far from ideal because they do not use the evaluation criteria in their search results, the sources and the information they have found on the Internet [14]. The students' abilities to locate, evaluate, and apply high quality information are terribly weak in order to solve the open-ended problems in their courses [15]. In web searching process, students have

more attention to surface markers, including currency, author, and 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]. Most students have lack of skills in understanding a text, evaluating the trustworthiness and relevance of a piece of information, and adapting one's strategy to the search process results [11].

Moreover, 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]. Through a review of the literature and a preliminary survey of practicing engineers, it had been found that a strong focus should be placed on evaluating information [18]. The overall research on students' information evaluation skills showed general weakness of students' abilities in critical evaluation of information and sources [5, 19, 20]. Hence, in order to prepare information among literate students for digital age, it is needed to integrate information literacy into the curriculum [21].

Unfortunately, instruction in 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 on evaluating online information and instruct them to be critical learners [23]. Besides, other researches have claimed that instructors can help to improve the students' evaluation skills via explicit guidance while implementing online searching activities [24].

On top of that, the findings from other studies identified that there is an essential need to educate, promote, articulate, and implement criteria for evaluating both information, resources, and synthesize information to construct new concepts [25, 26]. Based on a previous study, students were more confident in documenting and citing references, but faced more problems for information gathering and then evaluating [6]. The other 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 and also 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]. 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 [29]. Mobile learning promotes active learning, encourages the contribution of shy students,

promotes classroom accountability, and encourages student interaction [30]. Meanwhile, collaborative mobile-learning provides the ability of communication for learners to complete tasks and activities towards learning objectives [31].

In addition, 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 [32, 33]. Collaborative learning is the statement of learning where 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].

Besides, 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 [29]. Mobile Learning promotes active learning, encourages the contribution of shy students, promotes classroom accountability, and encourages student interaction [30]. Collaborative mobile-learning provides the ability of communication for learners to complete tasks and activities towards learning objectives [31].

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 focused on m-learning and u-learning environments show that it is possible to achieve genuinely personalized learning using such approaches [37, 38], few works 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 for several years in Malaysia, based on the findings from interview with lecturers and the scoring rubric conducted on students' assignments at an international university in Kuala Lumpur, the students did not examine and compare information from various sources in order to evaluate reliability, accuracy, authority, currency, coverage, and point of view or bias.

Moreover, 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 interview with twelve lecturers of diploma students at an international university in Kuala Lumpur indicated that students used convenience as the primary and the most used criterion to select online information rather other evaluation criteria. Lecturers confirmed that students often had 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 agree 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 agree 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 cause the contents to be easily altered, so evaluating what one has found on the www is crucial [39].

Consequently, using evaluation criteria for selecting information and sources can help to avoid using the 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 can provide an empirical basis for improvement strategies to increase DIES.

3.0 RELATED WORK

The findings from previous study conducted by Saunders (2012) indicated that students lacked discrimination and evaluation of sources in internet searching for doing 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 advancing the discourse of information literacy further into the disciplines, and both faculty and librarians should value the competencies with information literacy [4].

Another study conducted on reviewing the literature and a preliminary survey of practicing engineers by Waters et al., (2012) 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., (2012) recommended that the continued collaboration and discussion between librarians will be better equipped to help bridge the gap and the transition of the students from university to the 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].

The results of previous research by Wertz et al., (2013) which used content analysis with 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., (2013) developed a structured coding protocol and suggested a curriculum for helping students to develop appropriate strategies to access and to evaluate digital information [5].

A previous study by Walraven et al., (2013) found that most students lack the skills to successfully assess the trustworthiness and relevance of a piece of information. Walraven et al., (2013) 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 behavior, but did not achieve a transfer effect with regards to the use of criteria for the evaluation of websites and search results in workplace. Besides, Walraven et al., (2013) recommended integrating evaluation skills throughout the curriculum is essential to foster transfer and prepare students for lifelong learning and also teaching teachers on how to evaluate and how they can support their students to become critical web searchers [11].

The previous study conducted by Ross et al., (2011) expressed that students were less confident in their ability to evaluate information than in the other concepts probed. The study was conducted through an online survey with a sample size of freshman engineering students who reported documenting and citing sources as one of their most highly rated skills. Ross et al., (2011) suggested that more attention should be taken to include information literacy instruction, which addresses that part of the information gathering cycle and information evaluation skills.

Table 1 gives a summary of related works, including methodology, intervention, findings, and recommendations of the studies.

Based on the findings of previous studies conducted by Saunders, (2012), Wertz et al., (2013), Walraven et al., (2013), and Ross et al., (2011), most students lacked the ability to evaluate information and sources, and all of these studies recommended that integrating information evaluation instruction into the curriculum is essential for students. A limitation of these studies is that none of them used distance learning methods, such as mobile-learning to teach information evaluation skills to students. Moreover,

none of these previous studies combined and incorporated collaboration and interaction learning approaches in mobile-learning application to improve students' information evaluation skills.

The interactive and collaborative setting in the learning environment can enhance students' motivation and foster greater discussion among students [32, 33]. Mobile connectivity provides learners with the opportunities to discuss content with classmates and their lecturers, collaborate, and 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.

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 jigsaw model of collaborative learning model based on sociocultural learning theories (Aronson & Elliot, 1978) and interaction theory (Moore, & Michael G, 1989). The current framework was applied to information evaluation skills to demonstrate how collaborative and interactive learning approaches 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 was mobile-learning application that will affect the evaluation skills, while the dependent variable in this framework was the DIES levels.

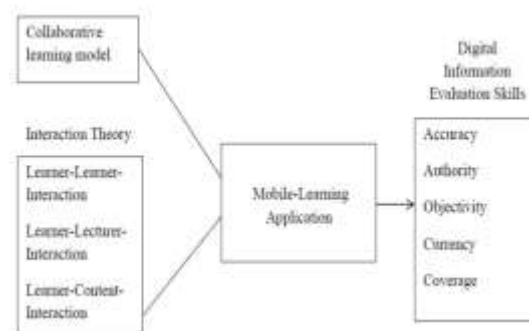


Figure 1 Conceptual Framework

Table 1 Summary of Related Work

Citation	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 the 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 from their perspectives on the importance and 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 is more closely associated with whether 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 of 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 of the students from university to the workplace.
[5]	1. Used content analysis with random sample of 40 memos. 2. A structured coding protocol developed for this study.	Overall research indicated that students used convenience as the primary criterion to select information over other content- and context-based criteria, such as source credibility, reputation, or bias.	Suggest a curricula need for helping 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 the trustworthiness and relevance of a piece of information. 2. The program improved students' evaluation behavior. 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.

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 Objectivity		Student does not identify the author's point of view.	Student briefly identifies the author's point of view.	Student identifies the 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%

	Students rated as Missing:	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.
Evaluates Coverage	41%	Students rated as Inadequate: 31%	Students rated as Developing: 26%	Students rated as Accomplished: 2%
Total	41%	33%	16%	1%

5.0 METHODOLOGY

In order to carry out deeper analyses of the digital information evaluation skills of students, a study involving 102 diploma students' assignments had been conducted. The students' assignments were analyzed using an adopted scoring rubric of Oaklef, (2012) for assessing digital information evaluation skills of 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, which evaluated if a student is 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.

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 using rubric in Table 2 indicated that in average, 41% of students were missing, 33% were inadequate, 16% were developing, and less than 1% of students accomplished in DIES, which concluded that most of students lacked DIES. 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 a study conducted by Ross et al., (2011), which expressed that engineering students were less confident in their ability to evaluate information. Besides, this research identified students' web searching competency level as low overall and this result is consistent with other previous studies [42, 43]. With the consistence to prior studies as well, 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].

Moreover, the lecturers also agreed that 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. It had been concluded that students often had 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, strong focus should be placed on evaluating information. We recommend that educators should provide university students with more training on evaluating online information and instruct them to be critical learners. It 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 also enhances the effectiveness of learning.

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