

## Assessing Digital Literacy Skills Using a Self-Administered Questionnaire

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### ABSTRACT

In the digital era, digital literacy is widely acknowledged as an essential skill for graduates of higher education. The skill helps the graduates to cope with the growing competitiveness in the borderless world and is one of the elements necessary for their life-long learning success. Given the growing importance digital literacy and its challenges in higher education, this study aims to understand the state of digital literacy skills of the lecturers and the graduate-level students from the Sukhothai Thammathirat Open University (STOU), Thailand. From the stratified random sampling of 45 graduate-level lecturers and 276 graduate-level students from STOU, we determined their digital literacy skills based on a self-evaluation questionnaire. We applied the digital literacy framework from Eshet-Alkalai for the development of the questionnaire. Reflection on the study indicates that top priorities that we can focus in preparing our students and lecturers in order to place a better value on digital literacy include the reproduction digital skill, especially the ones that is related to copyright awareness, information digital skill and socio-emotional digital skill. The paper concludes with the needs for the development of online and self-guided digital literacy assessment modules.

Keywords: digital literacy, digital skills, digital literacy assessment, self-administered questionnaire

### 1. BACKGROUND/ OBJECTIVES And GOALS

In the digital era, the proliferation of information technologies and digital contents have significantly impacted most of our daily lives. They pervade almost every aspects of our lives. To name a few, many of us now relies on these digital devices to remind us about daily schedules, to give directions for the quickest route to the destination, to connect with relatives and friends or even to make businesses out of them. The skills required to ‘survive’ within the

digital environment are not only just the ability to use software to perform the required tasks, but also include the ability to assess trustworthy online sources, identify biased web contents, share and integrate digital information, construct new knowledge and communicate with others and etc. (Greene, Yu and Copeland, 2014) (Martin, 2006). These skills are often collectively termed as ‘digital literacy’ in the literature.

Digital literacy serves as a new 21<sup>st</sup>-century skill-set. Work by (Osterman, 2012) concluded that a number of important shifts have greatly evolved the definition of digital literacy. One of the important factors include the change of linear reading and writing paths to non-linear, and multimodal text. A widely accepted definition given by Eshet-Alkalai (2004) refers digital literacy as “the assortment of cognitive-thinking strategies that consumers of digital information utilize”. It involves skills like cognitive, motoric, sociological and emotional skills for users to be able to use digital environments effectively (Eshet, 2012). We can also see from (Osterman, 2012) that scholars, institutes and education sectors are becoming more aware of the digital literacy or its related skills. Study by (Tang & Chaw, 2016) provides evidence that there is a need for students to be digitally literate for blended learning to be successful. Also, based on (Duggan, 2013), it is one of the factors necessary for the lifelong working and personal life.

Higher educations have utilized various information and communication technologies (ICT) as means to promote effective and accessible learning. Online tutorials, online courses, discussion forums, virtual classrooms, digital communication channels and course websites are some of the common examples on how these are employed. This poses new challenges as to whether the students and the faculty members possess *appropriate* skills required. Universities and colleges need to prepare their students and staff in order to place a better value on digital literacy (Littlejohn, 2012). Work by Van De Bogart, W. G. (2014) argued that the student-teacher interaction is important to the success deployment of social media software to learning. Training the teachers would also help with learners’ digital literacy skills. The acquired skill can also help the graduates to cope with the growing competitiveness in the borderless world and to meet the expectations from their employers in the area of digital literacy. For Sukhothai Thammathirat Open University (STOU), which is an open distance learning university in Thailand that follows the lifelong learning philosophy, access to digital learning materials are becoming more commonplace, especially for the graduate-level classes. STOU’s 15 years plan (2013-2027) indicated that in order for the university to successfully utilize ICT, it is necessary for students and faculty members to possess the digital literacy skills (STOU, 2012). Given the growing importance of digital literacy and its challenges in higher education, this study aims to understand the state of digital literacy skill possessed by

the students and lecturers. In this study, we measure the different digital literacy's skills of the lecturers and the graduate-level students from the Sukhothai Thammathirat Open University (STOU) using a self-assessment questionnaire. The questionnaire was developed based on the digital literacy framework from (Eshet-Alkalai, 2004) (Eshet, 2012). The paper then highlights the results from the study and summarizes further needs for online and self-guided digital literacy assessment modules.

## 2. METHODS

### 2.1 Research Framework

The objective of this study is to understand the state of digital literacy skill possessed by the students and lecturers, or in another word to measure the areas of digital literacy skill to obtain primary findings on the strengths and weaknesses on these areas. As mentioned, digital literacy skill is not only about the ability to use computer software, but it also encompasses range of skills which are necessary in response to today's evolving digital environment. Work by Eshet-Alkalai (2004) proposed a theoretical framework that can be used to create assessment tool for digital literacy. Osterman (2012) discussed in his work that the framework can be used to create assessment tool that can be used to increase understanding on the effective skills to the digital literacy. In this work, we developed a self-administered questionnaire based on Eshet-Alkalai's six-skill holistic conceptual model. Eshet-Alkalai's framework consists of the skill sets shown in Table 1.

Table 1 : Eshet-Alkalai's six-skill of digital literacy

Skill	Definition	Examples
Photo-visual digital skill	The ability to intuitively and freely 'read' and understand instructions and messages that are presented in a visual-graphical form.	Be able to understand and use the graphical representation of symbols and icons on graphical user interfaces of a software.
Reproduction digital skill	The ability to create new meanings or new interpretations by reproducing and manipulating preexisting any form of media (digital text, visuals, and audio pieces).T	Be able to create new art works by editing and manipulating preexisting audio and visual pieces.
Branching digital skill	The ability to stay oriented and avoid getting lost in the hyperspace (non-orderly and non-linear) while navigating through complex knowledge domains, such as in the Internet	Be able to navigate through websites in a non-orderly and non-linear fashion.

	and other hypermedia environments.	
Information digital skill	The ability to consume information critically and identify false, irrelevant and biased information.	Be able to assess information received and sort out subjective, biased and false information.
Socio-emotional digital skill	The ability to share own data and knowledge with others, capable of evaluating data, possessing an abstract thinking, and able to design knowledge through virtual collaboration.	Be able to communicate effectively in online communication platforms such as discussion groups and chatrooms.
Real-time digital skill	The ability to effectively process large volumes of fast-moving stimuli of sound, text and images in real-time.	Be able to execute different tasks simultaneously and switch the attention from one task to the other.

The digital literacy skills of the lecturers and the graduate-level students from STOU were assessed based on these skills through a set of questions using a self-administered questionnaire.

## 2.2 Participants

The digital literacy's skill was evaluated for two groups of participants 1) graduate-level students and 2) lecturers who teach graduate-level courses. Graduate-level students include both master and doctoral students from twelve departments at STOU who enrolled to courses in the second semester of the academic year 2013. Lecturers include those who teach at the graduate-level, both master and doctoral courses, from twelve departments. Stratified random sampling was used to obtain a representative sample, considering each department as a stratum, with a confidence level of 95% and an estimation error of 5%. A self-administered questionnaire survey was sent to the representative sample, resulting to a total number of 370 students and 189 lecturers. However, the total number of questionnaires returned for the student group was 276, and for the lecturer group was 45, i.e. a response rate of 74.59% and 23.80% respectively.

For the student group, the surveyed participants included 114 (41.3%) male and 162 (58.7%) female students. Majority of the participants are between 31-40 year-old (51.4%) and are working in the government sector (69.2%). The participants are diverse in terms of departments enrolled, and how related they are in working with ICT prior to commence courses with STOU.

For the lecturer group, the surveyed participants included 16 (35.6%) male and 29 (64.4%) female students. Majority of the participants had 1-5 years teaching via e-learning and other online media (75.6%) and were the frequent ICT users at work (55.6%).

### 2.3 The Questionnaire

For this study, the measurement instrument or the questionnaire for the digital literacy skills was developed based on the Eshet-Alkalai (2004, 2009). The six-skill framework of Eshet-Alkalai can be measured by the behavior and the capabilities of using the basic software for teaching and learning. Therefore each question is developed based on six skills. The questionnaire is divided into four parts. The first part gathered demographic information. The second part aimed to elicit respondent's usage behavior of computer system/Internet/digital media. The third part consisted of 20 questions designed to encompass the Eshet-Alkalai's six-skill framework of digital literacy, and the last part comprises of 5-point Likert scale questions on attitudes, beliefs and behavior regarding the use of computer system/Internet/digital media.

To assess the content validity of the survey, 3 experts in their respective fields were chosen to evaluate the consistency of the content and confirm it was valid for the purposes of the research. The index of Item-Objective Congruence (IOC) was employed to carry out the screening of questions specifically selecting items with IOC higher than 0.5 only. The questionnaire was also initially tested by 30 participants, the reliability (Cronbach's alpha were 0.85) was suitable. Kuder Richardson's KR-20 (Kuder and Richardson, 1937) was also used to determine internal consistency reliability of the third part's questions on digital literacy evaluation for dichotomous variables (i.e. correct vs incorrect). The test was administered to 30 participants and the KR-20 for the third part was 0.66, which is acceptable.

The design of the 20 questions, third part of the questionnaire, for the assessment of digital literacy skills was the main contribution in this paper. The measurement objectives of questions designed, categorized by the six-skill framework, can be summarized as follows:

Table 2: Measurement objectives by six-skill framework of digital literacy.

Digital Literacy Skills	Skills Assessed	Application Domain
Photo-visual digital skill	Identify browser icon correctly	Internet/WWW
	Demonstrate the knowledge of how to use 'undo' icon	Word processing

	Identify web link icon	Internet/WWW
Reproduction digital skill	Demonstrate the knowledge of 'copy' skill	Basic computer software
	Demonstrate the ability to share text/image/VDO on social media such as Facebook, YouTube, Line, Flickr or LinkedIn	Social media
	Know about copyright awareness when sharing text/image/VDO on social media	Social media
Branching digital skill	Demonstrate the ability to use hyperlinks (non-linear format) to browse around the websites	Internet/WWW
	Identify the correct link for a specific content on the website	Internet/WWW
Information digital skill	Critically assess the information found on the Internet.	Internet/WWW
	Identify correct and reliable information from the Internet.	Internet/WWW
	Identify the source of the content correctly.	Internet/WWW
Socio-emotional digital skill	Evaluate content of emails for hoax and scam contents.	Email
	Identify the impact of using/copying files when collaborating with others.	Word processing/ Presentation software
	Identify the effect of sharing opinions on social media.	Social media
Real-time digital skill	Ability to work on various computer software simultaneously.	Basic computer software
	Ability to switch task to another.	Social media

From Table2, each measured skill is associated with a contextual application domain. For example, 'critically assess information' is linked to Internet/WWW. We applied the skills to be evaluated to six domains. They are 1) basic computer software 2) word processor 3) presentation program 4) email 5) Internet/WWW and 6) social media. These are chosen because they are most often used in teaching and learning activities. The type of the self-assessment questions based on the above measured skills can be categorized into the followings:

- 1) Dichotomous 'Know/Do not know' or 'Able to/Unable to' question, for example,

Are you able to copy text/data tables/images from one program to another program by yourself?

1) Able to

2) Unable to

2) Single-answer/Multiple-answer knowledge testing question, for example,

Which of the following icon(s) can allow you browse contents on the World Wide Web?

1)



2)



3)



4)



3) Single-answer/Multiple-answer behavior-based question, for example,

How often do you open multiple computer software at the same time, for example, have email software opened while working on a word processor and conduct search on Google?

1) Never, will open one program at a time

2) Occasionally

3) Always

4) Others, please specify

### 3. RESULTS

#### 3.1 The Results

The research utilized a self-administered questionnaire to determine the initial digital literacy skill of both groups of participants, the students and the lecturers. The questionnaires were entered into excel worksheet for cleaning and imported into the statistical program, SPSS for analysis. In this paper, we highlight the result from the third section of the questionnaires, which is the 20 questions on self-assessed skills. The nominal variables were expressed as frequencies with accompanying percentages. The key results can be summarized for the graduate-level students and for the lecturers as follows:

### 3.1.1 Analysis of self-assessment analysis results for graduate-level students

**Photo-visual digital skill** – Most of the students can correctly identify browser icons (93.1% for Internet Explorer and 89.1% for Chrome). For software applications, 65.9% of students recognized icon for ‘undo’ operation.

**Reproduction digital skill** – Most of the students (94.9%) were able to copy contents from one program to another. However, for the copyright awareness, only 13.4% of students were aware of copyrights for contents not created by oneself and always make proper referencing and citation. Most of the students (30.8%) were occasionally aware of the copyright contents without referencing the source.

**Branching digital skill** – Most of the students (37.7%) had problems in returning to the original previous web page after clicking on several hyper-links and navigating through the websites.

**Information digital skill** – Most of the students assessed information from the Internet based on its reliable source (72.1%), followed by whether the information meet their needs (68.5%) and the least that students concern about with regard to information assessment are the correctness (51.4%) and copyrights (37.0%). About half of the students (54.0%) did not know how to assess if the website is secure by observing the website’s URL.

**Socio-emotional digital skill** – Some students were not aware of various forms of threats from the Internet. For example, 13.8% of students are willing to fill in their username and password when asked via emails.

**Real-time digital skill** – Most of the students (64.5%) were able to work on different tasks by having several software opened at the same time, followed by 28.3% of students that occasionally performed different tasks at the same time.

### 3.1.2 Analysis of self-assessment analysis results for lecturers

**Photo-visual digital skill** - Most of the lecturers can correctly identify icons for browser (95.6% for Internet Explorer and 84.4% for Chrome). For software applications, 80.0% of lecturers recognized icon for ‘undo’ operation.

**Reproduction digital skill** - Most of the lecturers (93.3%) were able to copy contents from one program to another. However, for the copyright awareness, only 15.6% of lecturers were aware of copyrights for contents not created by oneself and always make proper referencing and citation. Most of the lecturers (35.6%) were always aware of the copyright contents but did not provide reference to the source.

**Branching digital skill** - Most of the lecturers (48.9%) did not have the following problems 1) unable to return to the original previous web page after clicking on several hyper-links and navigating through the websites 2) do not know how to gather or use the information from web pages and 3) confused and do not know how to integrate information from multiple web pages.

**Information digital skill** - Most of the lecturers assessed information from the Internet based on its reliable source (91.1%), followed by the correctness of the contents (88.9%) and the least that lecturers concern about with regard to information assessment are the completeness (68.9%) and copyrights (71.1%). About half of the lecturers (53.3%) did not know how to assess if the website is secure by observing the website's URL.

**Socio-emotional digital skill** - Some lecturers were not aware of various forms of threats from the Internet. For example, 42.2% of lecturers opened emails from unknown senders.

**Real-time digital skill** - Most of the lecturers (62.3%) were able to work on different tasks by having several software opened at the same time. However, most of them (62.2%) needed to take some time to be able to integrate information from several sources to make use of them.

### 3.2 Discussion

Our research question was posed to understand the state of digital literacy skills among the graduate-level students and the lecturers at STOU. Based on the results from our study, students and lecturers groups have similar areas that need to be improved with regards to digital literacy. The top priorities that we can focus in preparing our students and staff in order to place a better value on digital literacy include the reproduction digital skill, especially the ones that is related to copyright awareness, information digital skill and socio-emotional digital skill. Moreover, findings from the analysis of digital literacy skills among Thai university seniors by (Phuapan, Viriyavejakul, & Pimdee 2016) indicated that the skill to 'evaluate' should be given the top priority for digital literacy development when compared to other skills. The result also indicates that student group, in particular, has

problems with branching digital skill and photo-visual digital skill for some of the common software programs. Real-time digital skill can also be improved for both group especially when it comes to information integration from several sources.

Work by Eshet-Alkalai and Amichai-Hamburger (2004) compared the skills of young users (school children) and adults (30-40 years old). Their findings indicated that young users are better than adults in some skills, for example, in photo-visual digital skills and branching skills. And in contrary, adults are significantly better in exercising reproduction digital skills and information digital skills. In our study, participants from both groups were adults, graduate-level students of STOU were mostly in between 31-40 years old. The skills of both groups cannot be compared in terms of age, but we can see that the student group is more diverse in terms of their ICT-related working experience, whereas samples from the lecturer group are required to perform similar ICT-related tasks based on their job.

In order to prepare appropriate skills to the students and lecturers, there are several approaches on how this can be achieved. One of which is to blend in digital literacy into the core learning objectives. However, the approach that we see useful before any long-term strategies can be implemented is to develop online and self-guided digital literacy assessment modules. We see that the development of modules to assess the skills based on the six-skill framework would be useful for common software applications such as 1) basic computer software 2) word processor 3) presentation program 4) email 5) Internet/WWW and 6) social media. The objectives of the digital literacy assessment modules are to assess any weak skills possess by the learners and to help guide the learning process that would improve the digital literacy skills. According to Eshet-Alkalai, Y., & Chajut, E. (2010), digital literacy skills can be improved when experience is gained through time. Daily uses can help to improve learners' experience.

### **3.3 Conclusion**

The results from the study brought attention to us, as researchers, as to the areas of skills that we can give priorities to in order to prepare appropriate level of skills to our students and faculty members. The major limitation encountered for this work, however, is the small number of lecturer group participated in the survey process. We concluded that there is a need to develop online and self-guided digital literacy assessment modules. These modules can facilitate both the students and faculty members to achieve the level of skills required. Future research will focus on the outcomes of the results from the digital literacy assessment modules. However, to improve the overall digital literacy skills of the students in the long run, there is a need for STOU to adopt a digital literacy agenda in a widespread and more

meaningful approach.

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