THE EFFECT OF AN ONLINE TUTORIAL ON STUDENTS’ INFORMATION EVALUATION SKILLS

Nadia Parsazadeh*, pnadia4@live.utm.my
Nurazeen Maarop,
Rosmah Ali,
Fadzilah Ahmad,
Norziha Megat Mohd Zainuddin,
Advanced Informatics School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia pnadia4@live.utm.my

Abstract. Studies conducted in many parts of the world indicate that students lack the skills to evaluate online information using established criteria which include information currency, relevance, authority, accuracy and purpose. The main purpose of this research is to investigate the effect of an online tutorial in improving students’ online information evaluation skills. The online tutorial offers students clear criteria definitions, examples, and provides practices of applying information evaluation criteria. To test the effectiveness of the tutorial, an experimental design was conducted. Students’ assignments were analyzed to compare students’ abilities in online information evaluation before and after using the online tutorial using a rubric. Results of the experiment analyzed using Wilcoxon Signed Ranks test indicate that the online tutorial is significantly effective in improving students’ online information evaluation skills.

Keywords: Distance education; Tutorial usability; Experimental design.

Introduction. The quality of online information is extremely variable because anyone can post data on the internet, and not all online sources are equally reliable, valuable, or accurate. Evaluating information is an important process in education and in life in general. Quality and trustworthy information is crucial for accurate data analysis and good decision-making. However, recent studies in different parts of the world, including Malaysia indicate that most students especially those in pre-university levels do not have adequate skills to examine and evaluate the currency, relevance, authority, accuracy, and purpose of online information. This is in spite of the increasing usage of computers and mobile devices among today’s students. It was found that most diploma students used convenience as the primary criterion to select online information rather than established evaluation criteria. Lecturers noted that students often cut and paste online-information without evaluating information and sources according to the evaluation criteria. Similar problems in other parts of the world are reported in the literature [1-3]. Furthermore, many universities face increasing number of students leading to large lectures, thus decreasing in-class interaction and collaboration, which can affect learning success and satisfaction [4]. To enhance students’ information evaluation skills, libraries often offer face-to-face tutorials, and in recent years also provide online tutorials. Online tutorials allow librarians and lecturers to provide a comprehensive range of information and supporting resources than would be available in a single workshop. An online tutorial can also provide an alternative mode of learning to students who cannot attend and join traditional workshops [5, 6]. Thus a study which employs an online tutorial that enables interaction between students and tutorial content can provide an empirical basis for improvement strategies to enhance the information evaluation skills of students.

Benefits of online tutorial. Online information skills tutorials have become a common method used to help students improve their information evaluation skills. Several studies have shown that online tutorials can be just as effective as in-person classes [7]. In fact, a report by the U.S. Department of Education found that classes with online learning, whether taught completely online or blended with face-to-face learning on average produce stronger student learning outcomes than do classes with solely face-to-face instruction [8]. Other previous studies mentioned that online tutorials can address students’ desires and needs to access research materials [9, 10]. Information technology can be utilized to increase the efficiency and effectiveness of the learning and teaching process [11]. Undoubtedly online learning plays a significant role in lifelong education. However, since only a limited number of online tutorials are available to enhance information evaluation skills, more applications with interactive components and activities should be developed for this purpose [5]. This study first developed an online tutorial for information evaluation skills enhancement, and then tested its effectiveness on a group of students.

Methods. The online tutorial was developed according to the instructional systems design model (ADDIE) in five phases: analysis, design, development, implementation, and evaluation [12, 13]. Fig. 1 shows the development process of the tutorial.

Information Evaluation Online Tutorial Needs Analysis and Design. The online tutorial needs analysis was done to determine the objective of training and whether the training is necessary to inculcate required skills. In an initial study, problems regarding online information evaluation skills of students were identified through literature review and content analysis on Malaysian diploma students’ assignments [14]. The basic tutorial design consideration focused on ensuring the content was consistent with face-to-face sessions to support the learning process with additional explanations, examples, and interpretive assessment practices. The design phase identifies learning objectives, and
specifies the instructional strategies and learner assessment method based on the outcomes elicited from the needs analysis phase [15]. Identifying the content for the tutorial started with a review of the information literacy (IL) competency standards for higher education approved by the Association of College and Research Libraries (ACRL) [16]. The standards describe the abilities required to effectively evaluate information.

In constructing the storyboard for an online tutorial, a typical online lesson was structured to include learning objectives, introduction, content, and tutorial summary. The online tutorial was divided into seven parts: evaluating information; currency; relevance; authority; accuracy; purpose; and further help. The tutorial describes the learning outcomes, and instructional definitions for every information evaluation criterion. It also provides examples, answers to practices, and summary related to every criterion. Fig 2 shows some of the interfaces of the online tutorial.

**Information Evaluation Tutorial Development.** Several authoring tools exist for creating online tutorials without needing advanced programming skills. Tool selection criteria often include team expertise, development costs, desired output, creative freedom and community or vendor support [17]. Articulate Storyline software was selected to develop the tutorial. Most of the recent online tutorials were generated with Articulate Storyline [5, 18]. This software is also used by different world libraries such as UCD University and the University of Leeds. Articulate Storyline software was chosen because it can produce several outputs including: Web, LMS, CD or MS Word, and hosted online service. Web browser outputs are supported for publishing on mobile devices. In addition, Articulate Storyline offers the opportunity to change the look and feel of the interface by changing the colors, layout, and navigation panel.

**Learning Activities in Information Evaluation Online Tutorial.** To provide students the opportunity to apply the evaluation criteria such as determining websites authority and accuracy, a range of activities including reading, exemplars, practice, answer, and summary were incorporated within each criterion of the tutorial. These activities appear sequentially through the tutorial. The types of activities and examples used include: animations, illustrated characters, interactive quizzes, true or false quizzes, extracting quizzes, screenshots, hyperlinks, and web objects. The online tutorial was divided into seven parts: evaluating information; currency; relevance; authority; accuracy; purpose; and further help. The tutorial contained learning outcomes, instructional definitions for every information evaluation criteria, examples, practices, answers, and summary related to every criterion.

The tutorial content including the evaluation criteria were adopted from Meriam library checklist [19]. A self-test activity followed by answers is included at the end of each criterion section. The tests or practices allow students to figure out what they have learned, and to recognize areas where they may require more help. Many information literacy studies indicate that interactivity and assessment can help to reinforce concepts learned [20, 21].

The tutorial also contained “further help” icon which offers students who require more practice, or need to advance their information evaluation skills further additional resources including links to an information evaluation checklist and a CRAAP test table using a rubric.

**Information Evaluation Online Tutorial Evaluation.** To validate the developed online tutorial, five experts were selected to evaluate it using an adopted scoring rubric. The experts were asked to evaluate the following features: design of instruction, course structure and organization, learner support and resources, effective use of course technology, and assessment and evaluation. This rubric uses a three-point scale which evaluates whether the online course needs revision, is sufficient, or is exemplary in a specific feature.

A usability evaluation survey was developed to assess students’ perceptions on the effectiveness of the online tutorial.
The survey consists of 42 5-point Likert scale items on 8 usability attributes, namely effectiveness, efficiency, timeliness, satisfaction, learnability, memorability, error, and cognitive load. Cronbach’s α value for the reliability of usability questionnaire was 0.95 in this research, indicating that the usability questionnaire was reliable. The online tutorial was offered to a group of student volunteers who have not been previously exposed to it. Thirty-five second-year diploma students in the computer science department at an international university in Kuala Lumpur took part in the tutorial. The students spent 120 minutes to learn the online information evaluation skills (OIES) in three phases of reading, discussion, and knowledge sharing.

During 40 minutes of reading phase, the online course provided each student in the home group to study the criterion that she/he is responsible to be expert in. Then, the students spent 40 minutes discussing in their expert groups to help each other, learn the material and prepare a lesson for their home group. The tutorial also enabled the teacher to answer students’ questions related to the course content. After a 40-minute discussion, students then went back to their home groups to share the information they had learned, and each group discussed all five criteria for another 40 minutes. In order to determine the extent of students’ abilities in evaluating online information, students’ assignments were collected in pre- and post-test. The pre-test and post-test consisted of multiple-choice assignment and essay assignment related to online information evaluation skills. The multiple-choice assignment created using Google forms is available in (https://goo.gl/b0uUih) and consisted of 5 multiple choice questions, with each question worth 0 to 3 points according a rubric table, for a total score of 15. The essay assignment consisted of 2 open-ended questions, for a total score of 15. The pre and post test results were analyzed using Wilcoxon Signed Ranks test to determine whether there were any significant differences in their OIES after participation in the learning activities.

To overcome threats to internal validity due to experiment and instrumentation, different items on the posttest were utilized than those used during earlier testing and the same measurement scale was used to grade assignments throughout the experiment in pretest and posttest [22, 23].

Results and discussion. Experts’ ratings on the scoring rubric of the online tutorial indicate that on average 4% of experts suggested revision, 21% stated that the tutorial is sufficient, and 75% stated that it is exemplary. The experts’ comments were more focused on improving interface design of the developed online tutorial in order to enable students to better identify the screens in their activities. As a result, some parts of the tutorial were changed according to the experts’ comments to improve the accuracy and appropriateness of the content, examples and practices to match students’ skills level.

The experimental results show that 46% of students were initially in “Poor” level in evaluating online information in the pre-test. After using the online tutorial, 71% of students achieved “Accomplished” level in the post-test. These results indicate that the extent of students’ abilities to evaluate online information was enhanced after utilizing the online tutorial. Table 1 displays the results of the Wilcoxon signed-ranks test to compare the pre and post-test of multiple-choice assignment and essay assignment scores of the participants. A Wilcoxon Signed Rank Test revealed a statistically significant increase in the scores of students’ multiple-choice assignment following participation in the tutorial ($Z=5.09$, $p=.000<.001$). The median score on the $C$, $R$, $A$, $AC$, $P$ scores increased from pre-test ($Md = 1,1,1,1,1$ respectively) to post-test ($Md = 3,3,3,3,3$ respectively).

In addition, a Wilcoxon Signed Rank Test revealed a statistically significant increase in the scores of students for essay assignment following participation in tutorial ($Z=4.78$, $p=.000<.001$). The median score on the $C$, $R$, $A$, $AC$, $P$ scores increased from pre-test ($Md = 1,0,1,0,1$ respectively) to post-test ($Md = 3,3,3,3,3$ respectively). On the basis of the results obtained, it could be argued that the use of the online tutorial significantly improved the OIES level of the participants.

The results of this study are similar to the results in a study by Leeder (2014) who tested students’ information literacy skills using an online credibility evaluation learning tool. The study findings showed a significant difference between groups in favor of the treatment group in their credibility evaluation skills. This study also concurs with Gikas and Grant (2013) who stated that internet connectivity provides learners with the opportunities to discuss content with classmates and their lecturers, to collaborate, and to understand tutorial content [24].

Table 1. Results of the Wilcoxon Signed-Ranks Test to compare the pre and post-test of multiple-choice and essay assignment scores

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Academic Achievement</th>
<th>N</th>
<th>Md</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posttest-Pretest</td>
<td>N</td>
<td>Md</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Multiple-choice Assignment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td>Pre-test</td>
<td>32</td>
<td>1.00</td>
<td>-3.25*</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>32</td>
<td>2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relevance</td>
<td>Pre-test</td>
<td>32</td>
<td>1.00</td>
<td>-3.72**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>32</td>
<td>2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authority</td>
<td>Pre-test</td>
<td>32</td>
<td>1.00</td>
<td>-3.66**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>32</td>
<td>2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>Pre-test</td>
<td>32</td>
<td>1.00</td>
<td>-4.08**</td>
<td>.000</td>
</tr>
</tbody>
</table>

482
Fig 3 shows the results of usability evaluation of the online tutorial by the participants. High percentage of agreement on Effectiveness attribute indicates that the tutorial provided personalized access to course contents and helped to improve communication between student and teacher. In addition the tutorial helped students to produce class assignments of higher quality.

![Student Response Graph](image)

**Fig 3. Results of Usability Evaluation**

A high percentage of students agreed with the efficiency attribute of the tutorial. This shows that the course structure in the tutorial is visually clear, and the vocabularies used in the tutorial are appropriate for students. In addition, the course learning objectives were achieved within a short period. Downloading of course content in the tutorial was speedy. Students agreed that the steps button in the tutorial guided them clearly and they did not need the support of a technical person to be able to use the tutorial.

A high percentage of students agreed with the timeliness feature of the tutorial. This means when the instructor posts a message in the tutorial, students could receive this message immediately. They also received feedback on their performance promptly.

The results of students’ perceptions on the memorability attribute of usability shows that students felt it was easy to remember how to use the tutorial, and they felt confident that they could use the tutorial with ease in future sessions. They believed the use of special signs in the tutorial buttons help them to recall how to use application effectively. This feature indicates high usability of the tutorial.

Fig 4 shows the overall perceptions of students regarding the usability of the online tutorial. The majority (42%) of the participants agreed with the usability of the tutorial. A total of 30% strongly agreed, 23% slightly agreed, 3% disagreed, and 1% strongly disagreed. It is clear from the given data that the tutorial is a usable mobile application in students’ perception for improving online information evaluation skills.
Conclusions. The results of this study may aid teachers and librarians in improving information evaluation skills of their students. Incorporating animation and interactive exercises along with text-based instruction can be used to better meet the needs of students with a range of different learning styles, especially those who are more visual thinkers. Integrating information evaluation online tutorial in learning may help to improve students’ information evaluation skills and academic performance. Learning through online tutorials promotes active learning, encourages the contribution of shy students, promotes classroom accountability, and encourages student interaction.

Acknowledgement. This work was supported in part by the Ministry of Higher Education, Malaysia, and Universiti Teknologi Malaysia under Grant 15H58.

References


