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## Rateskill as a Measurement Tool for ICT Competency Skills of E-Book Users

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### ABSTRACT

Computer competency refers to the level of expertise an individual has with regards to the computer. Currently, becoming computer competent is vital but being computer illiterate is even costly. Malaysian Government, in its effort to bridge the digital gap, is committed to the development and implementation of Information and Communication Technology (ICT) infrastructure among school children by initiating the e-book project. After years of spending on the ICT infrastructure, it is therefore timely to review the progress of e-book users in terms of their competency skills. For school children, the measurement tools such as interviews or questionnaires are not suitable because these children are not able to demonstrate their actual skills. It makes more sense to assess the children at the computer rather than using a typical pencil and paper test. We have developed a competency skill measurement tool called RateSkill for assessing the competency skills of e-book users. Equipped with log file analysis, the major benefit of RateSkill is the provision of automated analysis and immediate feedback. The unique feature about RateSkill is its ability to classify an individual's expertise into beginner, intermediate or expert level. With the implementation of RateSkill, the strengths and weaknesses of e-book users can be identified. Consequently, any plans of improvement to address the needs for incompetent children can be immediately suggested. The RateSkill has great potential to be commercialised to suit the demands of several key players such as future employers seeking for ICT competent candidates.

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## INTRODUCTION

The use of Information and Communication Technology (ICT) in educational sector has always been the concern of Malaysian Government. Through smart school funding initiatives, the government is investing considerably in promoting computer competency among school children. One of the significant efforts taken by Terengganu state government is the provision of electronic books to all Year Five students in Terengganu (Norizan *et al.*, 2013). In the literature, the term "electronic book" or e-book has been used widely in a variety of context. The definition of e-book often covers digital text, digital book or digital file displayed on electronic devices. For a detailed review, readers are referred to (Rao, 2003). In the context of Terengganu e-book, the term is meant to refer to a computer device that has been installed with academic applications (Norizan *et al.*, 2013). Figure 1 shows the view of the e-book.



**Fig. 1:** A view of e-book.

Many studies have centered on reviewing and re-examining the impact of ICT use in the teaching and learning (Hamzah *et al.*, 2010). Given the importance of ICT strategies and the substantial spending for the progress of ICT competency in school children, it is therefore extremely important to assess the level of

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competency skills of these children. The assessment needs to be conducted continuously over a period of time in order to ascertain that the children have acquired certain levels of computer competency. Once these children possess sufficient skills, they can confidently use computers as learning tools.

The assessment is indeed necessary because school children have different skills and experiences with computers. Some children have been using computers for years and already know most of the basic computer operations. Other students have lack of basic computer skills. This scenario has been known as 'digital divide'. Surprisingly, the digital divide was evident in the educational system when school children refused to touch the computer because they are afraid they might break it (Idrus and Atan, 2004). In addition, questions such as 'have the ICT initiatives produced more competent students?' or 'have the students acquired sufficient ICT competency skills?' cannot be answered with a simple yes or no. These questions require a set of evaluation tasks that are able to demonstrate the competency skills possessed by the children. Therefore, in the context of this research that is directed to the e-book usage, the study is carried out to identify the level of computer competency skill of an e-book user.

#### **Problem Statement:**

When performing user assessments, many researchers have stressed the importance of directing the focus on real users in real environments (Estrada *et al.*, 2009; Tselios *et al.*, 2008). There are many assessment tools available. Grant *et al.* (2009) highlight the use of two tools; a survey and a computer skills assessment tool. A survey is used to capture student's perceptions of their computer proficiency and a computer skills assessment measures their actual performance with three levels of proficiency i.e. beginner, intermediate and expert.

However, survey and other measurement tools such as questionnaires, direct observations and think aloud protocols are not practical for the school children (Norizan *et al.*, 2013). Those measurement tools often involve direct attention and engagement with the evaluators. As a result, children might not like the idea that they are being watched and evaluated; which could affect the task performance. Jacob Nielson (2001), a renowned usability guru insisted that when working with users, we have to watch what users actually do, not what they say they do. The assessment tool should be able to capture what users actually do when performing the given tasks.

Therefore, a more appropriate solution when evaluating the performance of these school children is required. A more practical approach is to use computer skills assessment tool that allows these children to demonstrate their competency skills directly at the computer. Not only the tool is able to capture the task activities performed by each student but also it can classify the student into one of these categories; beginner, intermediate or expert.

The authors chose to expand on the computer competency status of primary school children who were e-book users. Specifically, the following research questions were identified:

- a) What is the best way to capture and trace the task-based computing activities of the e-book users?
- b) How to design and develop a tracing tool that automatically analyzes the user's computing activities?
- c) How to classify the computer competency skills among e-book users?

#### **Objectives:**

Consequently, the research direction is tailored to fulfill the following objectives:

- a) To explore the possibility of using suitable tracing tool for capturing computing activities
- b) To develop an automated tracing tool that automatically analyzes the user's computing activities
- c) To identify the pattern of computer competency skills among e-book users

#### **Methodology:**

The research design employs a qualitative approach which consists of five research activities. A more detailed study has been reported in (Norizan *et al.*, 2013; Norizan *et al.*, 2013).

#### **Phase 1-Literature Survey:**

A literature survey has been carried out to determine the state of the art in the related area, particularly directed to the following scope:

- a) Computer event monitoring and tracing tools
- b) Document analysis techniques
- c) Computer literacy/competency evaluation methods

#### **Phase 2-Tools and Data Acquisition:**

##### **Sampling:**

Due to various constraints in terms of time, cost and accessibility, the authors adopted a non-probability convenient sampling technique by handpicking nine Year Five students who own e-books.

**Data Acquisition:**

This phase involves several sub-tasks:

- a) Compose relevant computing task activities
- b) Obtaining necessary computer monitoring/capturing/logging tools
- c) Conduct initial testing to collect preliminary data using several types of instruments i.e. keystroke logging and observation recording tools.

**Phase 3-Data Analysis:**

During data analysis, the authors perform two sub-activities; qualitative and technical data analysis. Content analysis is a widely used qualitative research technique. It is one of the numerous research methods used to interpret and analyze subjectively the content of text data (Hsieh and Shannon, 2005). Next, technical data analysis was performed in order to generate statistics of usage pattern and user activity levels. Necessary algorithms were used to automate the relevant process.

**Phase 4-Coding and Implementation:**

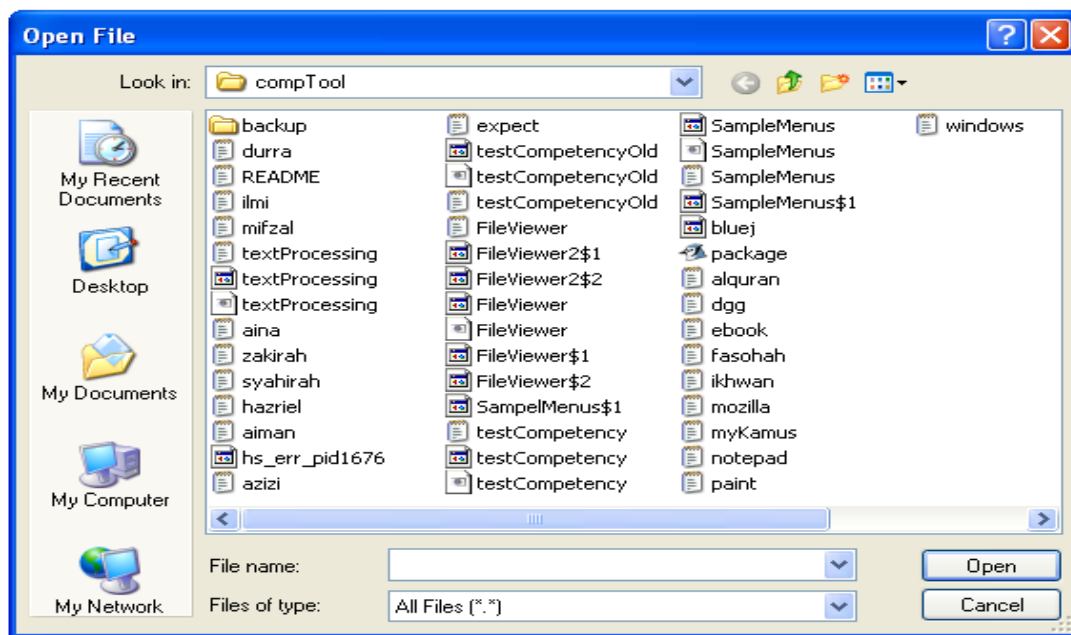
The graphical user interface (GUI) prototype has been designed and developed to demonstrate the successful implementation of the research project. The coding process was done in BlueJ version 2.5.0 and Java SE Development Kit 6.

**Phase 5-Testing and Evaluation:**

This phase involves testing and evaluating the users feedback based on the given computing tasks. During testing, the researchers prepared the CamStudio application and web camera for the purpose of capturing and observing the user's task event. To obtain other details on the usage of e-book and the demographic profile, a questionnaire was also distributed to the user.

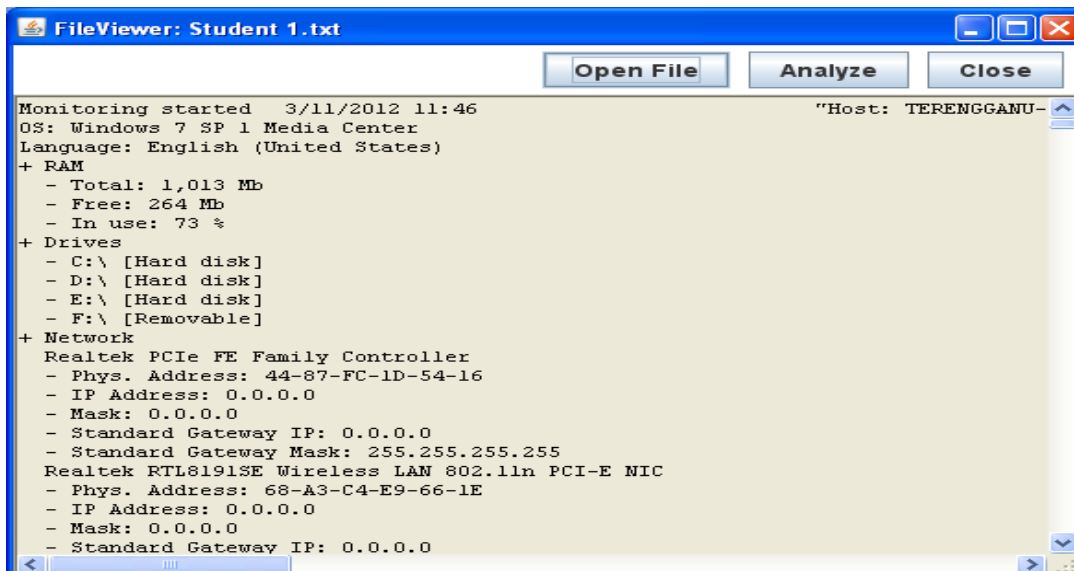
**The Rateskill System:**

This section illustrates some snapshots from our RateSkill system. To use the system, the user should select the log file as shown in Figure 2.



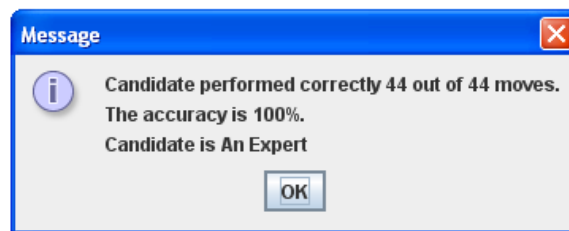
**Fig. 2:** Opening a log file.

Once the file has been selected, it will be displayed in the FileViewer window as shown in Figure 3.



**Fig. 3:** A sample log file.

To begin analyzing the log file, the user must click on the Analyze button. Upon completion, if the overall score for the computing task is above the threshold value, then the following screen as shown in Figure 4 is expected.



**Fig. 4:** A message prompt.

### **Conclusion:**

We have completed this research project and successfully developed the tracing tool called RateSkill that aims to measure and classify the computer competency skills of e-book users. The RateSkill is able to classify the proficiency level of the e-book users into one of the three categories; whether beginner, intermediate or expert. The RateSkill has a great potential to be commercialized as a generic tool for measuring and classifying the competency skills of other domains such as office staff and university graduates. Recognizing the weaknesses of incompetent individuals at an early stage would allow necessary remedy and support to be arranged immediately for this group.

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