

DEVELOPMENT OF ELECTRICAL DISCHARGE MACHINE DIE SINKING APPLICATION USING ANDROID PLATFORM

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ABSTRACT

The rapid development of Information Technology today has given a new impetus to the use of technology in education. It also affects the learning styles which changes into distance learning (d-learning) as well as mobile learning (m-learning). Its changes is consistent with the use of multimedia elements such as text, graphics and video in android application. This study aims to evaluate the developed Electrical Discharge Machine (EDM) Die Sinking applications using android platform in terms of design, development and function based on teaching and learning theory. Random sampling technique was used to collect the data from 30 respondents in the year of 4 in Bachelor Degree of Technical & Vocational (General Machining). The instruments to obtain information was in the form of questionnaire. Data were collected and analysed using SPSS (Statistical Package for the Social Sciences) version of 24. The study showed that this android applications meets the necessary criteria of content, presentation and interaction and it could help the students to understand the process of EDM Die Sinking.

Keywords: android, EDM DIE sinking, mobile learning, technical and vocational education

INTRODUCTION

The current state of education in today's world is also changing with the development of information technology. In this era of information technology, the use of multimedia in teaching gives a big difference to its growth comparing to the traditional way. Multimedia is claimed as powerful learning media to improve the students' interests and motivation (Mustholiq et al., 2007). Suyitno (2016) adds that multimedia prompts a positive and significant difference of the students' achievement. Accordingly, many courses was conducted by the Ministry of Education to strengthen the teaching process, for example the provision of technical courses of teaching aids (Hariyadi & Irawan, 2014). In carrying out the teaching process, teacher should be wise in selecting the most suitable material so that the information can be transferred accurately to the students.

Sarrab (2012) stated that in the 1980s, there had been a change in communication technology that brought changes in the online learning. Previously, it was used in the distance learning and then, it turned to the use of

electronic learning, known as e-learning. However, in the present study, it was switched to mobile learning, known as m-learning (Kim & Han, 2013). This changing happens because of a variety of mobile devices such as smartphones. Smartphones nowadays are affordable for all people because the price is reachable. Various application can be obtained easily by downloading through the application store. The use of smart phones as a medium of learning is very easy for every user, especially students. Therefore, to further develop the mobile learning, the researcher intents to develop an application for learning process.

The teaching and learning process has changed from the conventional form into the digital one. This is due to changes in developed technology and a number of changes that has been done. The revolution from the past to the present is the existence of the computer, so the creation of broadband internet and, now, smartphone either surgery system android, iOS, or microsoft. One important element is the hot issue on computer aided multimedia (Norfadzlan & Supli Effendi, 2013). The examples of media, such as newspapers, radio, mobile phone, television with the role of

disseminating information to users or the public.

Nowadays, mobile learning (m-learning) is practiced. The use of android application is seen as an important application in learning and it was developed in variety of educational applications such as Edmodo. The use of social applications such as *Facebook* makes widespread use of mobile education (Keong & Ash, 2013). Social media such as Facebook is not limited to be used for on-line communicating only, but also it is used as educational applications. Using social media and *android* app can help to develop a way of learning nowadays. The transition of teaching and learning is so fast that makes mobile learning important for every student (Taleb, Ahmadi, and Musavi, 2015). The mobile learning helps users, especially students because it can easily open the knowledge access for the students by using applications on their smartphones. They can use their smart phone applications as a guide in the learning and teaching sessions.

Mechanical field was booming in Malaysia where it occurs in vocational colleges and institutions of higher learning (IPTA). Mechanical field is divided into several sections. One of them is the field of machining (Ziemian & Sharma, 2012). Engineering is a broad field, and it is widely used nowadays. This is because most industries produce their products using the machine. Shabtai, Fledel, & Elovici (2010) explains that the use of android machine learning has positive impact and make it easier for the user to use the machine. Therefore, if the study did not use mobile learning, it will be unattractive and boring.

The use of learning based on printed materials only makes learning become tiring and unattractive. Abdul Rasid (2013) suggests that the print-based learning makes students bored and it cannot attract the students' interest. The main objectives of this study is to evaluate the developed EDM Die Sinking android application in terms of design, development and function based on teaching and learning theory.

METHOD

This study can be categorized as descriptive survey with quantitative approach. The research instrument was surveys with questionnaire. The questionnaire items were based on the past studies which had been approved experts to ensure that it is compatible with the objectives and research questions. All information and obtained data analysed in detail to ensure that the studies carried out to achieve the objectives.

The population of this study involved the students from the Faculty of Technical and Vocational Education (FPTV) Universiti Tun Hussein Onn Malaysia (UTHM) with the total 30 students from Bachelor Degree of Technical & Vocational Education (General Machining) which was taking Engineering Skills courses. This study used questionnaire to obtain the information data. The researchers arranged the research instrument and modified it after having discussion with the expert. The questionnaire consisted of four parts, Part A and Part B was for the design. For Section C was the part of EDM Die Sinking application development and Part D was the function of EDM Die Sinking applications.

In this study, data were analysed using descriptive statistics then categorized into mean, standard deviation, percentages and graphs. All data obtained from the questionnaires were analysed using Statistical Package for Social Software Version of 24.0 (SPSS). The analysis results were shown in Table 1. All parts contained in this questionnaire were analysed by assessing the mean score for each item based on a Likert scale of four degrees. The range of mean scores presented in Table 1.

Table 1. The Mean Score

Mean Score	Category
1:00 to 2:00	low
2:01 to 3:00	moderate
3:01 to 4:00	high

(Source: Mohd Yusoff Osman, Shaari, & Ghazali, 2012)

RESULTS AND DISCUSSION

Table 2 showed the results of respondents' answers according to item A1 to B4. It was found that the majority of respondents strongly agreed with a given item. It means that the respondents agreed that the application was able to provide a better understanding to students. Nawi, Hamzah, Akmal, & Sattai, (2014) stated that mobile learning made learning easy. The majority of respondents agreed that the design EDM Die Sinking application was able to provide clarity when the learning process

Table 2. The Mean Score of the Items A 1 To B 4

	Descriptive statistics			
	N	Agree (<i>f</i>)	Strongly Agree (<i>f</i>)	min
A1	30	5	25	3.83
A2	30	8	22	3.73
A3	30	7	23	3.77
A4	30	14	16	3.53
B1	30	8	22	3.73
B2	30	6	24	3.80
B3	30	13	17	3.57
B4	30	11	19	3.63

The objective of this second part was to evaluate the development of EDM Die Sinking application in helping students to master and to improve the visual abilities of the object and imagining in EDM Die Sinking. The results were shown in Table 3, in the form of the items analysis of part C in the given questionnaire to respondents. There were four items that were presented to respondents in this section. The majority of respondents indicated that they strongly agree on a given item and this showed that the EDM Die Sinking application was able to assist respondents in increasing imagination and visualization. The results found that the mean score was at a high level and it meant that the respondents agreed with the development of video before and after EDM Die Sinking process takes place. The distribution of the highest mean score was in the item C2. This showed that the respondents strongly agreed on the application of EDM Die Sinking can help

them in the process of imagining the real situation.

Table 3. The Mean Value of the Items C1 to C4

	Descriptive Statistics			
	N	Agree (<i>f</i>)	Strongly Agree (<i>f</i>)	min
C1	30	9	21	3.70
C2	30	6	24	3.80
C3	30	12	18	3.60
C4	30	10	20	3.67

The objective of this third issue was to assess the functionality of EDM Die Sinking application to meet engineering skills courses in order to assist respondents in the learning process. The results were presented in Table 4 in the form of item analysis of the questionnaire Part D. There were 4 items in this section that had been proposed to respondents to obtain their feedback on this application. Referring to Table 4 showed that the majority of respondents indicated that they strongly agree that the application can help them in the learning process.

Table 4. The Mean Value of the Results from Items D1 to D4

	Descriptive Statistics			
	N	Agree (<i>f</i>)	Strongly Agree (<i>f</i>)	min
D1	30	11	19	3.63
D2	30	13	17	3.57
D3	30	5	25	3.83
D4	30	11	19	3.63

The highest mean value was an item D3. This showed that the respondents agreed that the content in this application including Machining Skills course for EDM Die Sinking. Items of D2 showed low mean score. It means that the application has fulfilled the course skills in engineering 2 and it was able to achieve the course objectives.

Design played an important role in developing this application. Good design will

make this application interesting. The use of text and graphics is important for the learning delivery. The applications design was evaluated by an expert. The use of text and graphics in applications generate real impact in teaching and learning. Di Cecco & Gleason, (2002) point out text and graphics is crucial to produce a good delivery. Therefore, the use of text and graphics in this application is important to achieve the learning objectives.

Further, the use of text, size, font type, and colour also played important role. Therefore, the selection of text features such as text size, font type and colour of the text should be done carefully in developing this application. Jonid & Hanapi, (2010) suggests appropriate font size depended on the font type. If the font is Times New Roman, the appropriate size is size 12. In EDM Die Sinking application, the application used a size of 12 for each description. To the title and command was using larger size. This is in line with the opinion of Borland et al., (2009) on the use of text which indicating directions. Furthermore, the text colour used is an essential element in this application. Ahmad Zawawi & Mohd. Dom, (2012) suggests that the role colour plays an important role in brain development. Thus, text in this app was using different colours on the boxes. The use of different colours of text in the boxes in order to make the users always remember and actively follow the learning process.

Further, the use of graphics is one of the elements in this application. The use of graphics such as images and backgrounds in this app aims to educate consumers in line with the text. Che Mat & Halim, (2002), states that the relationship between text and images can improve user understanding. Furthermore, the suitable image resolution make the user comfortable in using this application. This application uses images resolution for the smartphone. In fact, users can also use this application as the device in vertical or horizontal position. Changes in application position provide different resolutions. Safaat,

(2014) explains the different positions makes the display resolution to be different. If the resolution is not appropriate, it will make the images broken and unclear.

Finally, the preparation of the image on the application. Respondents responded and said that the preparation of the images contained in this application by providing high value min. Freddy H., (2000), declaring that the image is a visual communication tool. This is because the use of images in an orderly manner in the application notifies users about what to do based on the image and indirectly help improve the understanding of users while using EDM Die Sinking. Therefore, the use of multimedia elements such as text and graphics in applications give a positive impact to users.

Once the application is developed, an assessment of the application was done through alpha testing. The findings based on the alpha test of three experts on the application at a moderate level. Therefore, some improvements have been made to this application. Firstly, a lot of improvements of this application was done without following the operating standards. Many suggestions and advice given by experts to ensure that the application meets the standard of EDM Die Sinking. As a result of alpha test, EDM Die Sinking application has further evaluation of the beta test. The beta test is carried out on a sample of respondents to replace. Results from beta testing this application is found at high levels. The results of this beta test shows that the application is compatible and able to help students solve problems using EDM Die Sinking.

The evaluation results of this application development showed the respondents “strongly agree” that EDM Die Sinking application can increase the user’s imagination and visualization. This statement was based on the high mean score in the early part of the discussion section. In the development, the respondents agreed that the video in this application showed the real situation. Keong & Abu, (2013) propose that the video application as a teaching tool can

attract and help to improve students' understanding in the teaching process. Then, the video resolution in this applications played an important role because if the video resolution was low, it caused the image become pixelated. Maniar, Bennett, Hand, & Allan, (2008), the appropriate resolution size was 320x480. Therefore, that pixel size was used in this application.

Also, the respondents gave high feedback that the use of video in this application giving a clear picture to the user. Cahyani & Karyanto (2016) states that the implementation of video improve the student learning. The video had been used to facilitate the students about the clear situation that occurs when using EDM Die Sinking. Lastly, the feedback from respondents on the content of this application, i.e. EDM Die Sinking topics should be preceded by the instructor's explanation about the functions of this application.

EDM Die Sinking application had been evaluated in accordance with the functionality to the respondents through the questionnaire construct in section D. In this section, researchers have put forward an item on the functionality of these applications in helping students in their learning process. The use of technology in teaching and learning process cannot be denied because of its potential ability to increase student academic achievement (Mohamad, 2007).

The results of the analysis showed the positive feedback from respondents based on the results of the questionnaire items where the applications can work well and it was indicated from high mean scores. Multimedia-based learning approach, especially at the level of higher learning such as the Institute of Higher Learning (IPTA) was able to provide a positive impact on students in the learning process (P & P). Evans (2008) points out the effectiveness of mobile learning is positively associated with education at the higher level.

The results of the analysis found that the use of video in this application can enhance

the imagination. Seidel, Blomberg, and Renkl, (2013) clarifies that the use of video as an appropriate guide to teaching and learning and at the same time to improve the students' imaginations. Also, the respondents stated that this application could help students while using EDM Die Sinking. This indicated that the functionality of mobile learning had a positive effect on helping students while using EDM Die Sinking. This is in line with the opinion of Nawi et al., (2014), that the use of mobile applications in teaching and learning have a positive impact and make it easier for the user. Furthermore, respondents gave high feedback on the gained understanding after using this application. Nawi & Isa Hamzah (2013) claims that the effective use of mobile learning provides better advantage of e-learning. Finally, the respondents highly agree on the contents of this application was easily used for the users. This is because the guide using the EDM machine was available in the smart phone users not in books or papers (printed). Khan, Al-Shihan, Al-Khanjari, & Sarrab, (2015) concluded that mobile learning was the future of teaching and learning.

CONCLUSION

Overall, this android application meets the necessary criteria of various aspects, including the content, presentation design and interaction design. However, these applications need to be improved, especially in terms of information and explanation. Finally, the researchers also indirectly identify the needs and requirements of users in the application.

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