

Building Motivation and Improving Learning Outcomes with Android-based physics books: Education 4.0

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This study aims to examine student's responses to the 4.0 learning era that cannot be separated from interaction technology related to retrieval, collection, processing, storage, distribution and presentation of information through the use of android gadget devices so that they are considered optimal in the educational angle. The method used is a triangulation method that combines two methods in one study to ensure authentic data through question tests, boarders and field observations. This study involved 72 junior high school students in 1 kawali. From the N-gain data table, the table showed average of the experimental class is 0.70 and High category, while the N-gain average of the control class is 0.26 and is in the medium category. That is, student learning outcomes after using teaching materials have experienced a very high increase compared to previous learning outcomes. Where these results suggest that an Android-based digital book can trigger an interactive and independent learning environment among students and students and teachers, because students' learning enthusiasm tends to be high. So that the target of learning can be delivered thoroughly. The limitations in subsequent research may be developed.

Keywords: digital learning, education 4.0, android e-book, physics, instructional media

INTRODUCTION

In the 21st century, digitalization has been included in every line of life and has even become a part of today's fast and practical necessities of life. No exception in the world of education that demands technology as a medium that can simplify and assist the learning process to the maximum. "... mobile learning is seen as the current alternative in assisting and motivating people to learn the language on the go" (Chachil 2015).

The development of technology has a significant impact on the process of information exchange, including in the field of education. Current education must be able to describe better meaning for students as students and teachers as educators. This is inversely proportional to the education situation which has not been able to become an effective facilitator of the learning process. In a dynamic way in the social, personal and personal life, with a background that supports the things that will be needed and in the 21st century it becomes important because of changes in the global (Chalkiadaki, 2018).

In learning, there are components of goals, materials, methods and evaluations that are interconnected with each other so that learning is said to be a system. "A learning must have a clear purpose, these objectives are described in teaching materials that are conveyed using specific approaches, models, methods or learning strategies that are deemed appropriate and appropriate to the conditions of

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students. One of the teacher's tasks is to plan learning activities that inspire all students to engage actively and productively "(Merill, 2012: 37)

Therefore, the Ministry of Education and Culture of the Republic of Indonesia has adapted three aspect of 21st century educational concepts to be developing a new curriculum: 21st Century Skills (Trilling & Fadel, 2009), the Scientific Approach (Dyer, 2009), and Authentic Assessment (Wiggins & McTighe, 2011).

Learning is a relatively permanent change in behaviour or potential behaviour as a result of strengthened experience or training. Learning is a result of the interaction between stimulus and response ... (Danang 2010: 13). In this case, the concept of achievement of a teacher is to be able to provide a large impact on the teaching and learning process so that it can make the learning directed and measurable for the success of achieving its students. Learning provides a new understanding and addition of insights so that someone feels they have new insights to support their life needs.

Mercier and Higgins (2013) explained that during teaching practice, the results of the research on the treatment of adoptive technological learning or precisely, in this case, NumberNet proved to be more supportive of increasing speed and simple calculation capabilities than conventional paper-based learning in general. Along with the need for effective and efficient learning methods and concepts, the use of information technology is very varied, especially in the era of digitalization industry 4.0 based on IoT which does not escape the role of the latest media innovations that are always growing rapidly. Media can be interpreted as a form and channel that can be used in a process of presenting information (Jamal, 2011).

Nowadays the use of E-books is very familiar among the general public, which is basically a product of raw materials combined with certain programming to be used or functioned as a substitute for printed materials, and of course this can be an innovation that is very likely to be developed to provide comfort in interacting and in the context of education etc. especially in the current modern era where smart gadget devices have penetrated every age level as well as in the education sector which can be felt to be greatly benefited because of the fast and easy acceleration of information through hands. Hanafi (2013) stated that the current reality makes it possible for activities carried out through the use of many other Android-based smartphone technologies.

Being a competitive generation is a necessity to be able to adapt to social change without being separated from the elements of skills and abilities that must be possessed. (Puncreobutr, 2016). In principle effective technology utilization modelled by school administrators both facilitates and unifies, this is expected to be the efforts of students and teachers to create a digital-age learning culture within a school." (Winslow, 2012: 01).

If we review through the education goggles, the main outline in learning is that there are components of objectives, materials, methods, and evaluations that are related to each other so that learning is said to be a system. Because basically one of the teacher's tasks is to create learning activities that inspire all students to remain actively and productively involved. Course material needs to be flexible so that different students may get different materials and orders from presentations that depend upon their own characteristics. (Surjono 2007)

This is inversely proportional to the educational situation that has not been able to provide more effective facilities for optimizing existing technological devices. Stalbovs, Scheiter, & Gerjets (2015) observed that the influence of each learning media will bring different impacts resulting from the implementation process. So that this affects the learning process which is not interactive and tends to be monotonous so it is feared students will get bored faster and not able to digest better the learning delivered by the teacher. Mulyani, (2010) In integrating ICT into the learning process, suggest two

approaches that teachers can take when planning learning that integrates ICT, namely: (1) topic approaches (theme centred approach), and (2) software approaches (software-centred approach).

According to Mayer (2009), in order to understand meaningful learning is required to emphasize the development of learning materials according to students' cognitive functions triggered by learning material, so that it is expected to be able to support effective knowledge construction in the learning process. This increasingly sophisticated technological development revolution provides a great opportunity for the use of technology devices that are so wide and increasingly accessible, such as on Android-based smartphone systems that are currently quite familiar to the general public.

Social change in this era of technology demands the generation to respond actively to meet human needs in their lives. In his theory, Puncreobutr (2016) said, there must be a change in the management of learning in terms of arithmetic, reading and writing. This is not just to build a smart and good generation but not apart from their ability to adapt in response to quality technical education in the era of quality and skilled ability to be able to adapt well.

By utilizing the momentum of the 4.0 industrial revolution, the world of education is expected to be increasingly motivated to always innovate for the implementation of quality and appropriate education. Niclan (2012) stated that the flexibility of e-learning is currently very dominant. Hence its usefulness and function are very helpful in growing the characteristics of learning today which cannot be separated from technological developments. Because of this mobility and convenience, some studies are interested in exploring further the usefulness of this mobile learning technology.

In the 21st century, the industry 4.0 technology and information must be used to transfer information by expert educators in educational institutions and in improving the quality of teaching and learning environments, not least by using Android gadgets as interesting media in learning. The method used is a triangulation method that combines two methods in one study to ensure authentic data. In this era of rapid globalization, Android is the right medium for delivering learning to junior high school students because almost every student makes it an inseparable object in daily activities and even becomes a primary need. A through question tests, boarders and field observations. Like Android-based physics books, Mardiana and Kuswanto (2017), explained that the physics learning media called the Android Moving Physics Learning (PML) media that drives Android has been developed to improve students' divergent learning in the field of physics with the Android package format.

Muqarrobin T.F and Kuswanto H (2016) ...the experimental class score is greater than the control class average score. This shows that classes that use physics e-book learning media have better learning achievements. It was concluded that interactive digital multimedia increased the activities and achievements of students in learning numeracy learning systems (physics). then it becomes a reference in the development of technology-based media, especially based on Android.

Therefore, it is necessary to have a scientific study that examines expository learning systems with technology-based learning or the use of android media in the same learning situation. So that it can provide reliable conclusions on the role of differences in learning observed to be used as a reference source for scientific studies and to provide.

METHOD

This study used a quasi-experimental two-group pre-test post-test non-randomized design with one control and one experimental condition. The concept of the approach is through two methods namely qualitative and quantitative approaches. Because it uses 2 (two) approaches it is called the concurrent triangulation method which is combining two methods in one study (Sugiono, 2008). The combination method is carried out to make an accurate data analysis. and it is hoped that through this research approach it will be able to provide research results to diversify and develop a product.

For an analysis method this study uses qualitative. To get a more in-depth and complete picture of the object to be examined by making direct observations in the field. Observation, interview, literature.

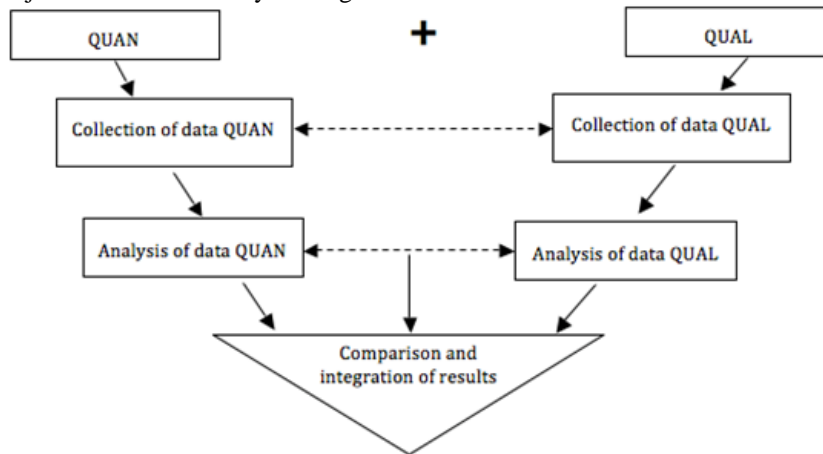


Figure 1
The Concurrent Triangulation Method Creswell

After the data source at the initial stage is determined purposively and is a snowball, then it is then analyzed through data that has been obtained from interviews, observation, and documentation and give the test result. Furthermore, to be used as a credible reference from the results of both studies (2 comparison groups) to be re-analyzed. Analysis can be done by combining the appropriate data obtained from the results of the study. This analysis is also carried out in a descriptive-exploratory manner so that intact quantitative and qualitative data can be obtained to be processed information. The results of qualitative data analysis are expected to obtain credible data from the results of research that has been done.

The research subjects were conducted at the level of junior high school in 1 Kawali with a sample population of 72 people divided into two class groups, including control and experimental classes.

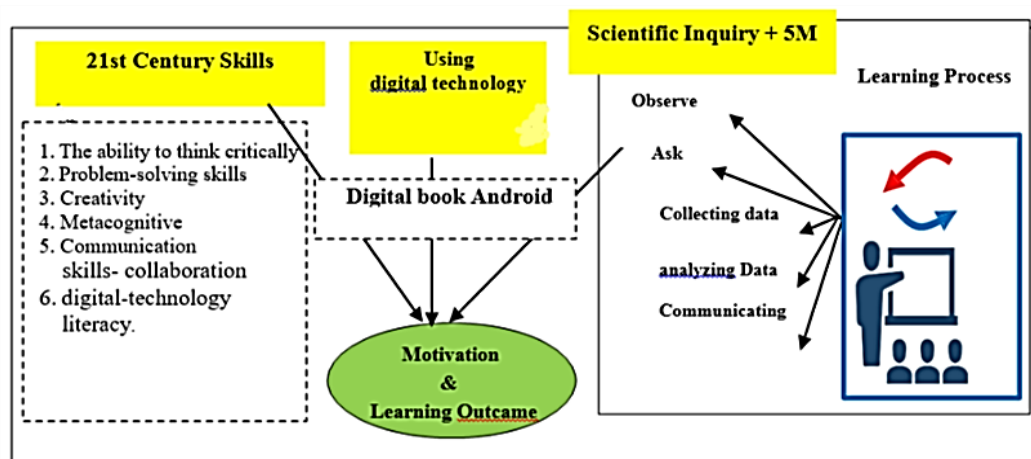


Figure 2
Research Design of The Relationship Between of Research Variable

FINDINGS AND DISCUSSION

In the process carried out after analysis of the preparation of data collection then provides a brief description of the research that has been achieved where this research originated from observations to schools namely Public Middle School in 1 Kawali. Based on observations that have been made, most students experience saturation in learning because there are still many teachers who use conventional teaching methods namely lectures and lack of use of learning media.

These things resulted in students not understanding the material being taught, not paying attention to the teacher's explanation, and students only focusing on their respective gadget. Along with technological developments, students tend to relate to motion communication devices or smartphones. The observations of researchers, the use of smartphones can confiscate student learning time, for example only to play music, play games, and access various kinds of social media. It is worrying precisely when those who feel bored while doing learning cannot accept learning interactions well and are even more interested in doing other things such as chatting with friends or using the situation by doing other activities with their smartphone.

Learning problems related to the calculation of numbers become an obstacle experienced by most students, especially this becomes more serious when the concept of calculating learning is reflected in the daily life in the real world that should have been done so that the theory of understanding can be implemented concretely (Baran, 2018). The tendency of reduced interest in student learning due to more attractive smartphones than books can be anticipated by making learning media that use smartphones. Smartphone which is compatible is using the Android operating system, The Android operating system was chosen because this system is the most used system than the other operating systems. The use of instructional materials for the implementation of learning using the smartphone is very easy and can be used independently by students. This learning instructional material can be used anytime and anywhere because it is portable.

In the current technological era, cellular learning uses the main supporting media in the learning and learning process to become a new paradigm in the world of education. (Furio 2014). This provides a new space in the advancement and dynamic of the world of education innovation.

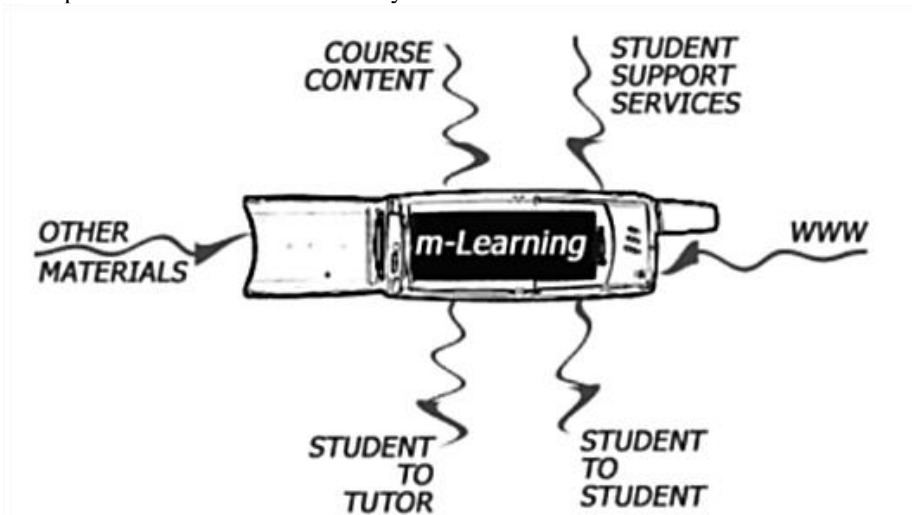


Figure 3
M-learning (Wireless Virtual Learning Environment)

The distribution process is quite easy because the size is not more than 10 MegaBytes. The deployment process can use data cables, Bluetooth, e-mail, download directly from the Play Store or through other media sharing to be installed offline. Apart from being used independently by students, this teaching material can be used by teachers in the classroom with the help of a laptop or PC and LCD. However, to use this teaching material on a PC or laptop requires the help of an Android emulator and supporting laptop specifications because it will greatly affect the smoothness to access it. The Android emulator can be downloaded for free and easy on the internet, for example, BlueStack, Jar of Beans, Genymotion, or Youwave. 2) Software (hardware) and hardware (hardware) Making Android-based media require appropriate hardware and software. The software used to make this teaching material has the following specifications:

- a) Android *Magazine App Maker*, is an IDE (Integrated Development Environment) to develop software in the form of an Android-based electronic system book.
- b) JDK (Java Development Kit), is a third-party installation to run the APK application.
- c) Android SDK (Software Development Kit), is a third party to operate an android application.
- d) Notepad++, is a developer application program that is useful for editing text and programming code scripts.

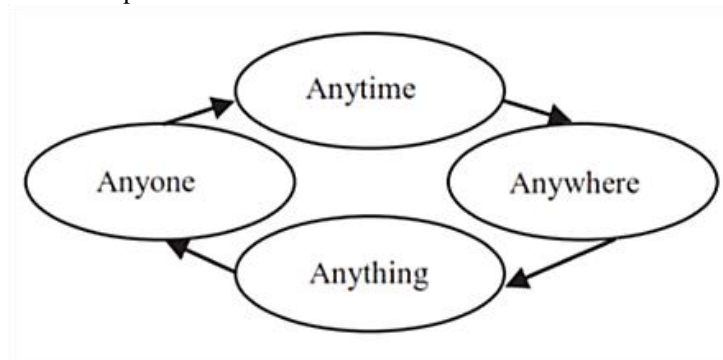


Figure 4
The Advantage of M Learning

In observations made through a comparative study on the Expository model and optimization of ICT devices are carried out periodically where applications are used as benchmarks in the application of android technology devices that are software that has been made in their entirety and the application has been tested as teaching material in thesis research with the aim of improving students' learning abilities and the results obtained from the results of the study it can be concluded that it can improve the interactive and effective learning process.

In this study, researchers acted as participatory passive observers in the sense that researchers positioned themselves as researchers who did not directly participate in activities, researchers only observed social conditions and collected data that occurred in the research situation. The researcher observed the learning process that took place in a normal context with the aim of observing the comparison of students' learning abilities using the Android E-book Application through optimization of gadget-based media devices with students learning with conventional methods, namely expository learning. In addition, researchers also want to find out whether the increase in learning abilities in the experimental class is in the high category. As for the time of the study, researchers attended a material practicum session in three meetings with a total time of 9 x 40 minutes. The researcher took two classes randomly as the experimental class and the control class namely class VIII D as the experimental class and VII C as the control class to achieve the results of the data intended to draw conclusions from the results of field observations that have been made.

Data obtained from the results of research conducted from March 19 to May 19 which includes data on social analysis, field observations, consultations with technology experts and material experts, application design, preparation of instruments, data collection to analysis of data obtained for the next made a report and drawing conclusions from the research process carried out. The data is directly obtained from real data sources in the field.

The results of several direct observations carried out in the field gave a positive impact on the introduction of new teaching materials used in the teaching and learning process. Where the students' enthusiasm towards the learning process increases, in the same conditions the teacher's emotional level is better and gives more value to the material conveyed by the teacher so that the stages of achieving the curriculum will be easily realized properly.

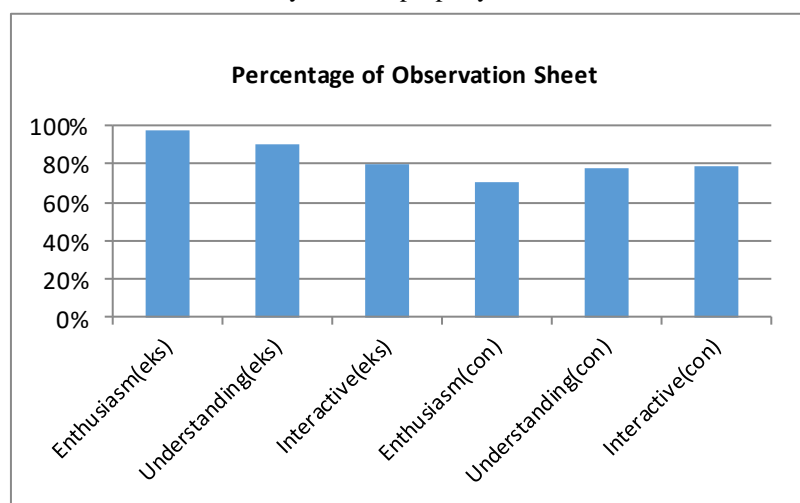


Figure 5
Percentage of Research Observation Sheet

In the following table, we can conclude that at the assessment interval the class given the Android application learning model (ex) tends to increase compared to the class given expository or traditional learning models.

Next, the researcher collects data through the technique of in-depth interview through the Principal as the main resource person and the Deputy Chief of Student Affairs as additional resource persons along with the teacher concerned through this data collection technique. accurately related to data sources needed in research specially to strengthen the credibility of data processed.

Then it can be concluded from several interviews with interviewees that the learning model approach uses an Android-based smartphone media system and through applications that are used as learning resources can provide a significant effect on student learning outcomes. Especially in a more interactive learning process and a livelier learning atmosphere because of the direct impact of student interest in learning to use gadgets that have been installed on their gadget devices.

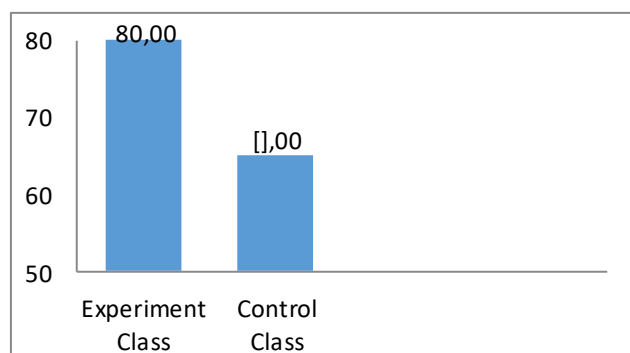


Figure 5
Average Value Percentage

The graph is taken from the average assessment of the data collection techniques that have been tested. So that it can be concluded the results of field observations, interviews and documentation show that the behaviour of students given experiments in the learning process shows a significant value compared to the learning process in the control class given an expository learning system.

Furthermore, from the pretest and posttest results of the two research classes, the difference scores were obtained. The gain score obtained by each student in either the experimental class or the control class to determine the improvement of students' problem-solving skills at the time before and after learning can be seen from Table 1 below.

Table 1
N-gain Experiment Class and Control Class

Class	The number of students	N-Gain Average	Category
Experiment	36	0,70	High
Control	36	0,26	Middle

From the N-gain data table, the N-gain average of the experimental class is 0.70 and High category, while the N-gain control class is 0.26 and is in the medium category. which means there is an increase in student learning outcomes with an average difference in N-gain in the experimental class and the control class with a good category (difference in significant differences), it can be concluded that, the increase in experimental class learning outcomes is higher than the control class.

CONCLUSION

The enthusiasm of students towards the learning model by using an android application is fairly good compared to learning with the expository model, it can be proven from the results of field observations.

Increasing the learning process increases more effectively than expository learning, it can be proven from the observation sheet and the results of documentation observation in the field. The very significant increase is on a limited scale of 0.70 and on a broad scale of 0.71. That is, student learning outcomes after using teaching materials have experienced a very high increase compared to previous learning outcomes.

Therefore the use of the Android-based physics books learning is considered capable of providing motivation and good learning outcomes in learning. this is evidenced through observation and field research regarding the optimization of smartphone devices students have. The limitations in subsequent research may be developed.

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