THE EFFECT OF USING DIGIMON (SCIENCE DIGITAL MODULE) WITH SCIENTIFIC APPROACH AT THE VISUALIZATIONOF STUDENTS' INDEPENDENCE AND LEARNING RESULTS

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ABSTRACT

The aim of this research was to determine the influence of digimon based scientific approach on independence and learning autcomes of learners. This research has designed as quasi-experimental nonequivalent control group design. Subjects of this reaserch is learners at 8 E and 8 F on SMP N 1 Magelang in year 2014/2015. The results showed that there was a strong perfect linear relationship between digimon with independent learning or learning outcomes of learners. The result of independent assessment on the experiment group was 85,47 while the result of independent assessment on the control group was 69,94. Digimon based scientific approach are influential 51.93% to the independence of learners, while the rest influenced by other factors. Digimon give influence 39.69% on learning outcomes of learners, while the rest influenced by other factors.This relation is empharized through an independent test (t-test) which shows dependent bridge between digimon with independence toward concept understanding of learners in experiment group.

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Keywords: Digimon, Independent, Learning Outcomes, Scientific Approach.

INTRODUCTION

Education is a systematic process to improve human capabilities holisticaly that allows our potentials (affective, cognitive and psychomotor) develop optimally. As quoted by Jaya (2012) the essence of education is an effort in preparing the students to face the environment which is always changing rapidly. Education is a trick in applying the principles of science and technology for the recreation of human beings. Education must be able to produce graduates who are able to think globally, and is able to act locally, guided by the moral and noble. Therefore, learning activities are designed to be able to provide a learning experience that involves mental and physical processes through interaction between learners, learners with educators, learners with the environment and with other learning resources in order to achieve the learning objectives.

Science learning objectives can be achieved when the learning process is understood by the learners. Students understanding of the science concepts, phenomena and natural events can be observed in through the processes of science done by learners. This means not only science learning in the form of declarative knowledge, but also learn about the procedural knowledge such as how to obtain information, scientific work habits, and thinking skills. The learning experience is realized through the use of learning approaches as well as a variety of learning media and students centered.

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The approaches and learning media used by educators to manage the learning process plays an important role in the students' success during the learning process. The educators are trying to use fun science learning models to give the impression that science is fun, but it is not offset by the use of learning media or interactive teaching materials. The success of the learning process are influenced by the fit between the subject matter and level of students' thinking skills. According to Dahar, which was quoted by Nuroso & Siswanto (2010) Every individual will experience a level of cognitive development, Junior High School students in Indonesia can be stated to have the level of formal operational cognitive development, due to have an average age of over 11 years. At these levels, children can use concrete operations to form more complex operations (able to think abstractly). Another thing to note in the success of the learning process is the use of appropriate approach to construct knowledge.

The regulation of the Minister of Education and Culture / "Permendikbud" No. 65 Year 2013 on the Standard Process Primary and Secondary Education has signify the need for a learning process that is guided by the principles of scientific or scholarly approach. Tureni (2014) stated that the effort of applying scientific approaches in the learning process is often touted as the hallmark of the curriculum of 2013 and into its own power on the existence of Curriculum 2013, which is certainly interesting to learn and further elaborated. Scientific learning approach has the result that more effective and efficient when compared to learning by using the traditional approach (Wieman, 2007). According to Fauziah et al. (2013), the curriculum in 2013 learning process at all levels by using a scientific approach to students centered. In this case, the students' is required both in the search for other learning sources and dig more deeply about the key concepts that given by the educators in the school either from an online source or media interactive learning.

Nagpal et al. (2013) self-learning is a process, method and philosophy of education where the learners gain knowledge by their own efforts and develop capabilities for investigation and evaluation. Zimmerman was quoted by Field et al. (2014) categorizing learners have learning independence if learners are able to determine their approach to learning optimally and efficiently, is responsible for decisions that have been taken, and able to cooperate with others to expand their knowledge.

One of the lesson that uses a scientific approach is the science lessons. Until these days during a science lesson, it still seems difficult to be understood by the learner. This difficulty is due to the science material dense, full of memorization, and mathematical. Interactive teaching materials is one alternative to make the learning process more interesting and meaningful to learners. One of the teaching materials whic is suitable for visualing the science concept abstractness is to use interactive multimedia. Suheri (2006) provides a definition of multimedia is media that combine two or more media elements consisting of text, graphics, images, photographs, audio, video and animation in an integrated way.

Based on the results of preliminary observations in SMP Negeri 1 Magelang, 77% of students get more enthusiastic about learning if the learning process involves technology experienced in it such as flash animations, interactive video, and using a digital module. A module has advantages when compared to the textbook, which are on a two ways communication, a clear structure, a friendly and motivating. The advantages of digital module is easily accessible and are more relaxed when compared to the printed books that have been used in the learning process. The real condition of module is dominated by printed modules, while the electronic module is less used in learning. Pummawan (2007) in his research stating that the e-learning modules can enhance cognitive development and ICT skills. Pramana & Dewi (2014) in the development of research shows that the use of e-book learning can instill independence in learners, the independent learning classical learners score is 82.13% (independence).

Therefore, the writer conduct a research related to the use effects of the Digimon (digital module science), using science approach on the theme of Independence visualization and students learning score so they can improve students' spirit to learn independently outside of the school hours, and are able to improve the students' understanding concept. Scientific attitude can indirectly instilled in students through technology based scientific approaches based. Digital module is used to deliver material "Visualization", because the material is a lot of material that require visualization, especially in the discussion of the properties of light and shadow on the process of forming in the lens or mirror.

METHOD

This research was quasi-experimental with a non equalivalent control group design (Sugiyono, 2010). The population in this study were stu-

dents of grade 8 second semester of SMP N 1 Magelang. The sample in this study were taken as much as two classes, the control and the experimental class. Samples were taken at random cluster sampling technique, to obtain grade 8 class E as control and 8 F as an experimental class. The method used to obtain the data consists of a documentation method used to obtain data on early learners who will serve as research samples; the test method uses posttest to obtain the learners concept understanding; and observation method is used to measure the learners' level of independence.

This study was started with observation to determine the problem and to analyse the situation, then constructed the product in the form of digimon. Digimon that had been developed subsequently validated by experts in materials, media experts and science teachers to determine the feasibility of digimon as teaching materials. Digimon was implemented in the experimental class while using the control class used students' worksheets, and finally the level of independence and the learning outcomes of students in both experimental and control class were measured. The results of the assessment of independence and learning outcomes of students in the experimental class then correlated with the response of students toward the digimon. Correlation coefficient calculation was performed to determine the level of influence of digimon towards independence and learning outcomes.

RESULT AND DISCUSSION

Validation toward digimon was conducted by three experts: material experts, media experts, and science teacher. The results of this validation were used to determine eligibility of digimon with scientific approach as teaching materials before

they were used for data retrieval. The scores of the assessment by material expert, media experts and science teacher were 94.74, 88.46 and 85.29 respectively with the average results of 89.50 in very good category. Results of each aspect of digimon assesment can be seen in Figure 1.

The assessment of learning aspect by material expert, media expert and science teacher obtained 91.25% with the criteria of very good. It was based on the appropriateness of learning components contained in digimon with the assessment criteria. The assessment criteria were the accuracy of the factual material contained in the digimon, digimon's relevance to the available resource material, as well as whether the use of digimon can stimulate independence and motivate learners in the learning process guided by scientific approach.

The content validity obtained a score of 96.43% within very good criteria. This indicated that the substance or the material contained in the digimon was in line with core competence and basic competences. The video and animation presented in digimon strongly supported the material. Practices with its key answers was seen as very helpful for learners to learn with visual theme.

For the display aspect, it achieved 87.50% with very good criteria. This was caused by the consistent design of display and could be viewed in an organized and attractive format to be used as teaching materials. Digimon was presented with moderate colour composition so as not to disturb the concentration when it was used. The type and size of the text used in the Digimon had been adjusted to facilitate readability for users. Digimon was also equipped with the navigation key, so that learners could easily operate digimon as learning materials.
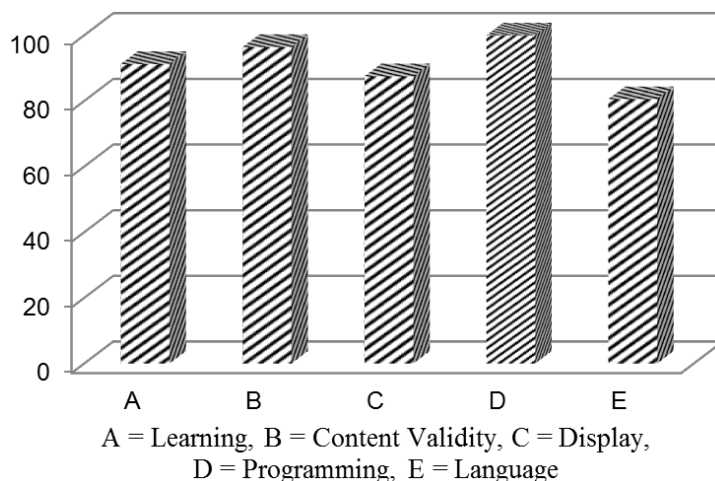

A = Learning, B = Content Validity, C = Display,
D = Programming, E = Language

Figure 1. Digimon Validation Results for each Aspect

Programming aspects was only judged by media experts with value of 100% and fitted into the criteria very well. Programming aspect included programming across lesson components, the speed and accuracy of media response toward user commands. Each learning unit in digimon comes with pictures, video or animation related to the topic. The navigation buttons on digimon were designed using Bahasa Indonesia so that the users of these products could understand the function of each button appropriately. These buttons were very responsive to commands completed with the search box to find certain words or key terms contained in digimon.

Aspect of language was assessed by material expert, media expert and science teachers with value of 80.56% belonged to good criteria. Aspects of language assessment included the use of language, the use of the phrase, and the consistent use of terms or symbols. Digimon were presented in accordance with standardized Bahasa Indonesia and adjusted to the level of cognitive development of learners. The symbols in the digimon had been adapted to the symbols in other teaching materials, making it easier for learners to apply the formulas. Some foreign words or terms were also used in digimon, but foreign all lexis were explained and defined in the glossary.

Students' Responses toward Digimon

The responses of students toward digimon were taken using questionnaire sheet consisting of 12 statements with one to four scoring. Learners's responses were used to determine students' responses, especially on the theme of vision. The results of the analysis of the response of students to digimon were next correlated with independence and learning outcomes, to determine its effect towards the 2 aforementioned factors. The results of the analysis of students' responses toward Digimon can be seen in Table 1.

Learner response data to the Digimon presented in Table 1 indicated that the acquisition of the highest value of the response toward digimon was in the first statement, with a value of 92.50. This showed that students liked teaching materials in the form of digimon with scientific approach, due to the multimedia-based teaching materials incorporated with audio visual animations, video, and explanations related to the materials. The interest of students towards digimon with scientific approach on science teaching was evidenced by the acquisition of the statement "digimon makes me happy to learn science" with a value of 91.67. This is supported by research by Susanto et al. (2013) which states that the interactive media leads to high interests and activities of students and increase learners' understandin, with the achievement of 75% of the total learners passed minimum mastery score.

Learners responded with the lowest value of 77.50% as the answer for the statement "I believe I will score better in science after I use digimon". It showed that learners were not fully convinced to be able to increase their science scores due to the use of digimon in learning. The average responses score toward digimon was 89.94. This showed that the experimental class students responded positively to digimon with scientific approach used on the theme of vision.

Relationship between Digimon with Scientific Approach with Students' Independence in Learning

Table 1. Students' Responses toward Digimon

No	Statements	Mean
1	I like digimon	92.50
2	Digimon's presentation is very interesting	90.83
3	The language can be understood easily	89.17
4	The words do not cause multiple interpretation	82.50
5	I often access digimon	83.33
6	I am more motivated to learn using digimon	88.33
7	Learning with digimon helps me to understand the subject faster.	85.00
8	Digimon makes me happy to learn science	91.67
9	Digimon is very helpful in learning	90.00
10	Digimon makes my learning practical and enjoyabe	86.67
11	I prefer learning using digimon than using book	85.83
12	I believe I will score better in science after I use digimon	77.50
	Average	89.94

The results of the analysis of the observation toward students' independence showed that the average value of independent learning of experimental class is 85.47, while the control class scored 69.94. This indicated that the cultivation of independence toward learners in experimental class was higher than the control class, supported by t-test. These results are supported by research of Pramana and Dewi (2014), which revealed that the classical score of independence of learners of 82.13% was obtained from the use of e-book during the learning process. The independence level of experimental class was demonstrated through the acquisition of the percentage achievement of each aspect.

The obtained percentage on the aspect of the use of science teaching materials, the experimental class gained score of 89%, while the control group only reached 72%. This was because the experimental class in addition to using common teaching materials, they also used additional teaching materials from digimon and other books to support learning, and their awareness to use other supporting learning materials in experimental class categorized into good category, although there were some students in the control class that did not use additional teaching materials.

The percentage on aspects of assignment completions and self-evaluation in the control and experimental classes were 73%, 50%, and 78%, 80% respectively. Based on the analysis, the experimental group had a higher percentage than the control class for both aspects mentioned. This was caused by the digimon contained independent assignments to be done by the students in each sub-theme, and was accompanied by instructions to perform a self-assessment for learners. Class experiment also showed better results than the control class on aspects of asking questions, answering questions, and being active in discussions obtaining scores of 82%, 77% and 90% while the control group gained percentage of 65%, 57%, and 80 %. These results related to the design of digimon with scientific approach in a way that more learners demanded more active role in the learning process.

The percentage of readiness in practicum aspect for the experimental class and control class were 86% and 67%. This is because the digimon proposed young scientist activities in which learners require to take responsibility for any lab activities including preparing lab tools and tidying them up after being used. The aspect of seeking information from various sources and aspects of attention when learning in the experimental class had higher values than the control group (84% and 89% in the experimental class, and 56% and 78% in the control group). This might happen since digimon was equipped with animation and video that could be used to help students in understanding the subject, and to lead students to be more enthusiastic in participating in learning.

The high percentage of achievement for every aspect of each independence aspects of experimental class was in line with the proportion to the number of learners who belonged into very independent category of as presented in Figure 2.

There were 27 learners of experimental class and 2 students of control class who fitted into the category of very independent while the rest goes into the category of independent, quite independent and less independent. This shows that the scientific approach digimon could instill independence of learners. These results are supported by research of Oktiral et al. (2013) which states that the use of audio-visual media is proven to raise the independence of learners. Learners are able to be creative, learners are keen to heed the lessons, and are motivated to learn so that learners show their active participation during learning process.
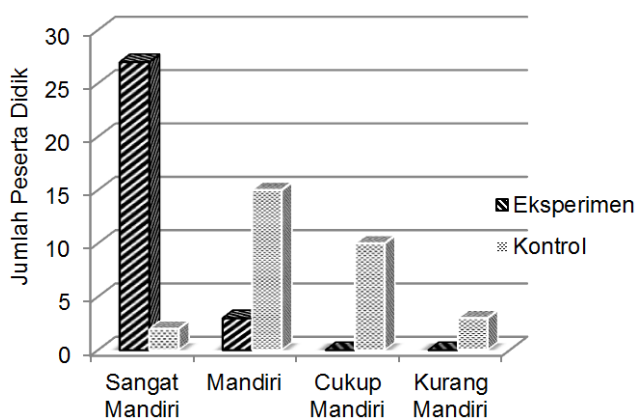
Other results obtained from this study were

Figure 2. Review of Students' Level of Independence

the strong relationship between digimon and the independent learning of experimental class students. The correlation value is obtained from the value of the response of students to Digimon with the value of independence of experimental class students. The strength of the correlation relationship was demonstrated by the acquisition of the correlation coefficient (r) of the analytical results of 0.721 which meant that there was a direct perfect linear relationship between learners' response value toward students learning independence. The contribution made by digimon towards independent learning of students in the experimental class amounted of 51.93% while the rest was influenced by other factors. Linkage relationships were confirmed through independence tests (t test) which indicated the dependent or intertwined relationship between digimon with the independence of learners.

The strong correlation can occur because of learning by using digimon with scientific approach could lead students to be more enthusiastic in learning and stimulate learners to be able to actively participate in learning through scientific approach. This is supported by Fauziah et al. (2013) which states that the scientific approach can motivate and instill internal attitude on learners. Learners can also do a self-evaluation and determining the level of mastery of the concept toward the material that had been learned through independent tasks or evaluation contained in digimon to measure the achievement, particularly in learning on the vision theme.

This study showed that the use digimon in learning was effective to instill independence of learners compared with the use of textbooks in science of vision theme. This is because digimon with scientific approach taught materials in the form of a module that combines the approach with the development of technology and instructional media so as to increase the enthusiasm of learners and facilitate the planting of independence of learners in this modern times. This is supported by Nurlailiyah et al. (2014) which states that computer assisted learning media with a scientific approach is very feasible and attractive to be used in the learning process.

The Relationship between Digimon with Scientific Approach with Students' Learning Achievement

The results showed that the use of digimon with scientific approach was able to strengthen the scientific understanding of the concept of the experimental class students in learning vision theme. This is supported by Kamaludin (2011) which states that learning by using the integrated science module can improve the understanding of the concept.

The average value of understanding concept of the control class and experimental class were 79.19 and 85.09. This indicated that the score of understanding concept of students in the experimental class was higher than the control class. Classical completeness of learners also showed the same thing, since 25 of 30 students in experimental class fell into the complete category (values over 81) and 16 of 30 students in control class belonged into the complete category. The positive achievement toward the results of experimental class was reinforced through a difference test (t test) which produced t_{count} of 3.84 t > t table of 1.67. This indicated that the average value of the experimental class obtained better results than the control class.

Other result obtained from this study was the strong relationship between the responses of students toward digimon with the level of concept understanding of the experimental class students. The responses affected up to 39.69% and 60.31% was the influence of other factors. This relationship was emphasized through independence tests (t test) which indicated the existence of a relationship between digimon to the understanding of the experimental class. This result meant that digimon as teaching materials was able to maximize the level of understanding of the experimental class students, especially on the vision theme, which required a lot of visualizations and animations. Digimon was a module that was developed in digital form with the use of technology, and equipped with animation and video that serves to facilitate learners in understanding the material. This is reinforced by research Nusir (2013) which revealed that the use of the program or multimedia and appropriate methods of learning can improve math skills.

Overall results of this study indicated that in addition to the digimon with scientific approach could embed learning independence, while provided a positive achievement toward students' understanding. One of factors which might lead to the acquisition of these results was digimon with scientific approach contained young scientist activity as well as the self-evaluation for the learners, thus stimulating learners to be more active in the learning process. It could help instill independence in learners. Digimon was constructed simply and interestingly to cultivate students' enthusiasm to use digimon. Digimon equipped with animations and videos facilitated learners to understand the material, thereby students' understanding toward the concept got better.

CONCLUSION

Based on data analysis, it could be concluded that the digimon with scientific approach affected the independence and learning outcomes of students on the vision theme in SMP N 1 Magelang. Digimon brought a perfect linear relationship toward the independence and learning outcomes of students on the vision theme in SMP N 1 Magelang.

The researchers advice to further research to follow up this study is that in the making of digimon, you need to pay attention to the file extension being used, in order to facilitate learners in opening and studying it. It will be much better especially when digimon is available in .apk file and .ios for android and iphone so that it can be accessed through simple gadgets.

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