The Effectiveness of Using Electronic Book (Epub 3.0) with Blended Learning Approach on Science Classroom

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Abstract. Integrated science subjects in junior high school are developed as subjects of integrative science intended to obtain basic competencies in science and technology and to cultivate scientific thinking critically, creatively, and independently. This study aims to determine the effectiveness of digital books (epub) as learning resources in increasing knowledge and students' skills in learning science. Blended learning combines face-to-face learning with e-learning using learning resources for elektronic books (epub). The results showed that the use of emulsions (epub) with a blended learning approach was effective in improving the 5 aspects of knowledge of grade sevent students in science learning. Based on the N-Gain test, the use of emulsions (epub) with a blended learning approach can increase students' knowledge by 0.65 in the medium category. The average value of science process skills after applying the elektronic book (epub) with a blended learning approach is 65.32% with the medium category.

Keywords : Elektronik Module (epub), Blended Learning, Science

1 Introduction

Current technological advances and developments require educational institutions to immediately introduce and apply ICT as innovative learning. In the world of education, especially learning, the implementation of information and communication technology has a positive impact because by using the development of technology. Integrated science subjects in junior high school are developed as subjects of integrative science (biology, chemistry, physics) which belong to the group of subjects of science and technology (IPTEK) intended to obtain basic competencies in science and technology and to culturally critical, creative, scientific thinking and independent [1].

In science learning the approach taken is generally teacher oriented (teacher centered) which affects the low activity of students in learning. Furthermore, the unavailability of learning resources that develop learning activities of students independently. These problems cause the learning outcomes of students have not reached the minimum completeness criteria, namely 71.

The module is a complete learning unit specifically designed for learning used by students individually or in small groups without the presence of a teacher. An instructional module is an instructional unit designed for use by a single learner or small group of learners without teacher's presence [2]. The use of information technology in learning is known as e-Learning. E-learning refers to learning using electronic device services. One form of presentation of learning material in digital or electronic format is e-book.

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Electronic book as a form of presentation (digital) learning materials that can be accessed using electronic media such as smartphones, tablets, and computers. Electronic book (epub) supportive functions can be embedded in the textual contents such as pictures, videos, referential links, guided readings, automatic repetitions [3] [4]. Furthermore, the branch is friendly and supports different operating system platforms various devices with Android, Windows, Mac, and BlackBerry platform [5].

Use of electronic book (epub) as teaching material is expected to facilitate the independence of learning along with the use of smartphones among students is increasing. Research related to the use of digital books states that learning using epub based books provides satisfaction for students [6]. The participants indicated that the iBook significant difference in the achievement of students, provided a new way of learning, and also motivated them to learn, made learning more exciting, increased their attention toward instruction, was more efficient, and increased their interest in the class [7].

Blended learning is part of e-learning that utilizes information technology media to create optimal learning programs for students. Blended learning is a blend between face-to-face learning and e-Learning. Blended learning is the combination of different training "media" (technologies, activities, and types of events) to create an optimum training program for a specific audience.[8] The term blended means that traditional instructor-led training is being supplemented with other electronic formats. In the context of this book, blended learning Programs use many different forms of e-learning, perhaps complemented with instructor training and other live formats [9]. The usage of blended learning tools not only enhancing students' campus learning experiences but providing quality and friendly learning environment as a whole [10].Categories the main distinctions between traditional academic and e-learning environments [11].

Table 1. Differences between face to face and online learning environment

	Face to face Learning	Online Learning
Focus of course	Group	Individual
Focus of content	Teacher Centered	Student-centered
Form	Synchronous	Asynchronous
Time	Scheduled	Anytime
Place	Classroom	Anywhere
Flexibility	Standardized	Customized
Content	Stable, durable	Dynamic, transitory
Number of students	Space delimited	Without limits
Instructor preparation	Some (transparencies)	Extensive pre-preparation
Distribution of materials	Hard copy	Electronic download
Interaction	Spontaneous	Structured
Range of interactivity	Full interactivity	Limited interactivity

Effective learning can be achieved by optimizing all learning components including learning objectives, students, teachers, learning materials and media, strategies, learning resources, and evaluation. All of these components are interrelated and influence each other as a learning system. This study will apply elektronic books as learning materials as well as blended learning as a learning approach that is oriented towards learning goals.

In this study, the use of a electronic book (epub) contains a number of subject matter consisting of principles, concepts, theories, and procedures (tutorials) that are applied using a blended learning approach. Indicate that students have a good learning about object methods

through the preview via ePUB3 functions with flip blended learning [12]. The purpose of this study is to determine the effectiveness of electronic book (epub) as learning resources by using a blended learning approach to improve knowledge and skills the process of science students in junior high school. Science process skills are skills that are used in shaping science knowledge in solving problems and formulating results [13].

2 Research Methods

This study includes a type of quantitative research with a research design of One Group Pretest-Posttest where a group of subjects were given treatment for a certain period of time. Measurements are made before and after treatment is given. The results measured are aspects of knowledge (remembering, understanding, implementing, analyzing, and creating) [14] and process skills (observing, measuring, and communicating) through initial tests (pretest) and final tests (posttest). The research design is illustrated in the following table;

The population in this study were seventh grade students of MTsN 1 Garut and MTs An Nur 3 with a sample of 33 students. Learning outcomes on aspects of student knowledge through objective tests (multiple choice and essay) validity and reliability.

Technique of analyzing assessment data on science process skills is based on formula

$$\% = \frac{Science\ Process\ Skill\ Score}{Maks\ Score} \text{ x } 100\% \quad (1)$$

and the percentage of students who get a score of 4 is used the formula,

$$\% \text{ x} = \frac{\mathbf{f}}{\mathbf{N}} \text{ x } 100\% \quad (2)$$

with the following percentage categories;

Table 2. Percentation of Science Process Skills Category [15]

Persentase (%)	Criteria
≥ 85	Very Good
70-85	Good
55-70	Medium
40-55	Less
≤ 40	Very Less

3 Results and Discussion

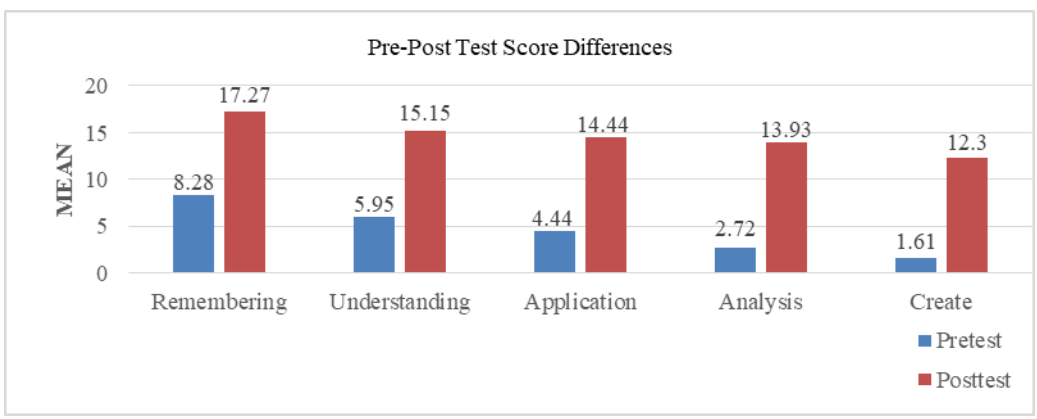
3.1 Student Knowledge

The blended learning approach combines face-to-face learning and e-learning by using the learning resources of e-module (epub) science learning on the concept of science objects and their observations. E-learning with independent learning is oriented to fulfilling the aspects of student knowledge as learning outcomes. Furthermore face-to-face learning in the classroom is oriented to the fulfillment of science process skills.

Figure 1. Epub PC Version

Figure 2. Epub Mobile Version

Pretest is carried out before the use of emulsions (epub) with a blended learning approach aims to measure students' initial abilities. Then posttest was carried out to find out the students' knowledge after applying emulsions (epub) with a blended learning approach. The giving of 30 questions was adjusted to the 5 categories of cognitive questions (Anderson & Krathwhol). Here are the results of the pretest and posttest;

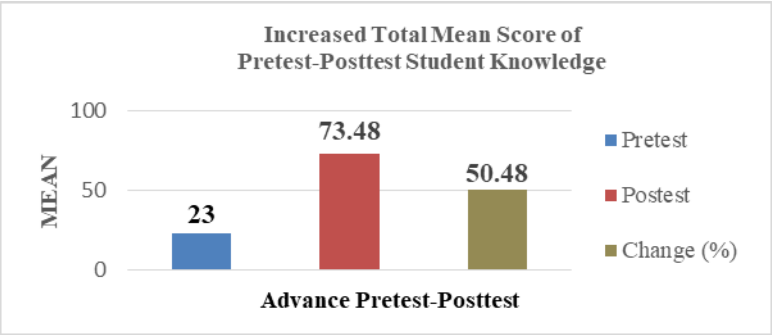


Based on table 3.1 the results of the pretest and posttest calculation obtained the average score of students on 5 aspects of knowledge with a maximum score of 20 in each type of question. Prestest results show the highest average remembering ability of 8.28 (41.4%) compared to other categories of knowledge (cognitive). The posttest results show the highest average remembering ability of 17.27 (86.35%) compared to other categories of knowledge aspects. (cognitive) after applying the elektronic book (epub) treatment with a blended learning approach to science learning.

The high average value of pretest and posttest categories is given because this ability includes the level of thinking that is easiest in the aspect of student knowledge. Recall categories are characterized by students' ability to answer questions regarding the definition or understanding of concepts. The second order is the largest value of pretest and posttest in the understanding category of 5.95 (29.75%) & 15.15 (75.75%) marked by the students' ability to explain the material in accordance with their opinions. Besides that students can demonstrate the ability to provide examples and provide conclusions about the principles and concepts in science material.

The ability to apply the knowledge aspects of interpret 4.44 (22.2%) & 14.44 (72.2%), is shown by students by applying their understanding of concepts and principles in the new situation. Students are required to demonstrate their ability to classify, calculate (convert numbers), connect, and modify principles and concepts. The average pretest and posttest scores in the analyzing category were 2.72 (13.6%) & 13.93 (69.65%) marked by the students' ability to describe concepts or principles into clear and detailed parts. The ability to create 1.61 (8.05%) and 12.3 (61.5%) is the lowest value in the aspect of knowledge. This category requires students to demonstrate the ability to assess and produce an idea based on certain criteria. This is due to the lack of learning experience of students outside of school and is only guided by the material provided by the teacher in learning the concepts and principles of science so that students cannot produce a new method or method other than the material given by the teacher to the epub.

Increased overall student knowledge on aspects of knowledge 5 categories of Andersoon & Krathwhol, showed a percentage level of 56.05%. The overall average score (pretest) of students' knowledge was 23 then after being given the emulsion (epub) with the blended learning approach (posttest) it increased to 73.09. The difference between the average pretest and posttest scores shows that there is a difference in the increase in students' knowledge (5 categories of Anderson & Krathwol) before and after treatment.



Testing the hypothesis regarding the effectiveness of using elektronic book (epub) with a blended learning approach in paired samples used t test (Paired Samples T Test) with a significance level of 5%. From the results of the normality test, the results of X2 Hit (4.72) < X2 Table (7.82) are normally distributed. Furthermore, the t test (Paired Samples T Test) is carried out as follows;

Tabel 3. Paired Sample Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest Postest	-32,72727	17,90124	3,11621	-39,07478	-26,37977	-10,502	32	,000

Based on the results of t test (Paired Samples T Test) and testing criteria Sig. 0.000 < α = 0.05 then Ha is accepted : there is a difference in the average pretest and posttest values meaning the use of electronic book (epub) with a blended learning approach is effective in improving students' knowledge. Furthermore, to find out the increase in pretest-posttest results, the N-Gain test is performed [16] obtained 0.65 (medium) which means that after applying of elektronic book (epub) with the blended learning approach, there is an increase in students' knowledge at a medium level. Research results on all matters dealt with a blended learning approach is more effective than traditional face to face learning approach was concluded [17] [18] [19]. One of the main reasons for this situation can be shown as that students engagement on learning and the ability of students to use adequate technology.

3.2 Student Skills

Face-to-face learning on blended learning is a form of reinforcement given to students after independently learning activities with learning resources namely electronic book (epub). Teaching methods in face-to-face learning consist of lectures, demonstrations, and experiments. To know the science process skills students are required to practice (experiment). Process skills measured include the ability of students (observing, making inferences, and communicating). Based on the following observations, the results of the assessment of science process skills are presented;

Tabel 4. Percent Assessment of Science Process Skills

No	Aspects of Science Process Skills	Indicator	Percent (%)
1	Observations	• Formulate problems and hypotheses	72.63
		• Observe objects according to procedures	69
		• Using a measuring instrument correctly	76.63
		• Compare using appropriate measuring instruments	74.50
		• Perform unit conversions on observed (objects)	80.25

Mean			**74.6**
2	Make Inference	• Collect relevant facts (information) according to observations	78.13
		• Use patterns	55.50
		• Relationship between aspects observed	55.63
		• Conclude up the observations	71.13
Mean			**65.09**
3	Communicate	• Make observations / experiments in the form of graphs / tables / diagrams clearly	57.13
		• Explain the results of the experiment	59
		• Explain the report systematically	52.63
Mean			**56.25**
Mean of Science Process Skills			**65.32**

Based on Table 3.2, the aspect of taking measurements obtained the highest percentage of 74.6% in the good category. Furthermore, skills in aspects make inference by 65.09% with enough categories. The lowest average value in science process skills is the ability to communicate by 56.25% with enough categories. Overall the average value of science process skills after the application of elektronic book (epub) with a blended learning approach is 65.32% with the medium category.

Three aspects of science process skills, the aspect of observing is the ability most easily carried out by students. This is because the emodule (epub) contains information about the explanations of the steps (procedures) in making observations so that students can do it easily. To improve the skills of making inferences and communicating in using and linking patterns between observed aspects, explaining the results of the experiment and report systematically needs to be given more learning time accompanied by regular teacher guidance.

Electronic book (epub) as instructional material and learning resources contains material regarding the study of principles, concepts, and procedures (tutorials) that are adapted to the demands of the 2013 curriculum in Indonesia. Content on the electronic book (epub) is composed of multimedia consisting of a combination of several media including text, audio, visual, video, and animation. Results were in accordance with regional and international, the multiple advantages supplied by e-books in increasing student motivation to learn and developing academic achievement [20] [21] [22]. The electronic book (epub) provides an opportunity for students to be able to do learning activities independently without the limited space and time to keep interacting with learning resources. Video or film media can improve the effectiveness and efficiency of the learning process, including overcoming distance and time.

4 Conclusion

Based on the results of the research that has been done, it can be concluded as follows;

The use of electronic books (epub) with a blended learning approach is effective in significantly increasing students knowledge (5 categories of Anderson & Krathwol) on science

learning. Based on the N-Gain test, the use of elektronic book (epub) with a blended learning approach can increase students' knowledge by 0.65 in the medium category.

The aspect of taking measurements obtained the highest percentage of 74.6% in good category. Furthermore, skills in aspects make inference by 65.09% with enough categories. The lowest average value in science process skills is the ability to communicate by 56.25% with enough categories. Overall the average value of science process skills after applying the elektronic book (epub) with a blended learning approach of 65.32% in the medium category.

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