The Development of *Multiple Intelligence-Based* E-Books on Grade V Science Learning In Elementary Schools

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Abstract: This study aims to produce an *EBook based on Multiple Intelligence* in class V science subjects in Gunung Putri Cluster Elementary School and analyze their feasibility and effectiveness. This study used the development model of Borg and Gall and Dick and Carey. To test this feasibility using the assessment of 3 experts, namely media experts, design experts and material experts. Media expert test results are 73.5% or fall into the feasible category, material expert test results are 99.35% and design experts are 99% or in the very feasible category. The results of the *independent t test* obtained a significance of 0.0 27 < 0.05 meaning that it was rejected indicating that there was H_0a difference in the science scores of students in the experimental class using *Multiple Intelligences-based* EBooks with control classes using printed book media / science packages.

Keywords: EBook, Multiple Intelligence, Science, Elementary School

Introduction

Education in Indonesia has entered 21st century learning. Education in this century is required to prepare learners who are able to face global economic competition. *Partnership for 21st Century Skills* emphasizes that the 21st century must teach 4 competencies, namely *communication, collaboration, critical thinking*, and *creativity* (E. Y. Wijaya et al., 2016). 21st century skills are important skills that must be mastered by everyone in order to succeed in facing challenges, problems, life, and careers in this century (Redhana, 2019). In the 21st century, education is increasingly important to ensure that students have learning and innovation skills, skills to use technology and information media, and can work and survive with *life skills* (E. Y. Wijaya et al., 2016).

In the first role of a teacher is to be able to prepare students who have 21st century skills. Learning in the 21st century demands many things from a teacher, especially those related to abilities and skills (Tarihoran, 2019). A teacher needs to master several areas, be proficient in pedagogy including innovations in teaching and learning. In addition, the teacher acts as a role model for trust, openness, perseverance, and commitment for his students in facing life in this century. In preparing students who are able to get used to 21st century life skills, it is necessary to have the quality of learning with learning systems and resources that can support it. The quality of learning can be seen from the readiness of teachers in preparing quality teaching materials. Teaching materials prepared to support the learning process must also be in accordance with the demands of the 21st century and also the all-technological round of industry 4.0.

Problems in the learning process were found at SDIT As-Salaam Gunungputri, based on the results of observations it was found that; 1) students have difficulty in understanding science material because it is considered a difficult subject, 2) students are less interested in science learning, 3) students have difficulty in finding reference sources for science material literacy, 4) students want learning with audiovisual media, 5) students want learning resources that can be carried everywhere easily. Then, the results of an analysis of the needs of students in the aspect of identifying problems in learning show data, material that is considered difficult in science learning content, namely heat transfer. The material on heat transfer is found in Theme 6 KD 3. 6 Applying the concept of heat transfer in everyday life.

The use of theme books as a source of teaching materials for students at this research location only focuses on discussing the material or focusing on developing the cognitive aspects of students. With heterogeneous student characteristics, teaching materials should be needed that are able to facilitate the characteristics of each student.

Based on the results of observations made by researchers, class V students at SDIT As-Salaam have a tendency to carry out learning activities that use activities such as observation, music use and are happier when invited to study outside the classroom. Like the theory of intelligence expressed by Hogward Gadner known as *multiple intelligence.* This theory argues that every human being has some kind of intelligence, in which in doing something every human being inevitably uses a whole type of intelligence. The only difference is the portion of use of each such intelligence.

The development of *multiple intelligences* for learners needs to be carried out. With a student who realizes how his type of intelligence is, he will understand how to learn so that it will be maximized and improve his learning outcomes. Based on the analysis of the needs of students and teachers, as well as the importance of *multiple intelligence* for students, it is necessary to develop interesting and effective teaching materials in improving student learning outcomes.

Theory Review

Multiple Intelligence

Gardner's rationale for coming up with this theory about *multiple intelligences* was about the limitations of IQ tests focusing only on mathematical (logic) and language abilities in uncovering individual intellectual abilities. In fact, each individual has a unique and different way of dealing with the problem at hand. Gardner (Aji & Bhakti, 2021) so that the scores a person gets from an IQ test cannot yet describe a person's intelligence.

This theory of *Multiple Intelligences* eliminates the assumptions that have existed so far about humans. According to Gardner (Indria, 2020) there is not a single human activity that uses only one kind of intelligence, but rather the entire intelligence which has been considered seven or eight kinds of intelligence, and in the latest book is added again the kind of intelligence becomes sembilan. All these intelligences work together as a whole and unified whole. The composition of the integration, of course, varies in each person and in each culture. But overall all of that intelligence can be changed and improved. Then Asri (Indria, 2020) the most prominent intelligence will control other intelligences in solving problems. Compound intelligence consists of eight types, namely verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, musical intelligence, kinesthetic intelligence, interpersonal intelligence, naturalist intelligence, intrapersonal intelligence (I. K. W. B. Wijaya, 2018).

EBooks

E-book stands for *Electronic Book* or electronic book. An e-book is nothing but a form of book that can be opened electronically through a computer. This e-book is in the form of files with various formats, EBook is a series of ordinary writing made with the help of *Microsoft Office* software or other similar *software* (Fitria & Heliawan, 2017). After the series of writings, it becomes like writing in conventional printed books as it is on the market. In addition, EBooks according to Shiratuddin (Khoirunnisa et al., 2020). EBooks are textbooks that are converted to digital format. EBooks also have the meaning of a learning environment that has an application that contains a multimedia database that stores multimedia presentations on the topic of a book.

Theories That Support Learning Using EBooks Based on *Multiple Intelligences*

Behavioristic Theory

Behavioristic learning theory is a learning theory initiated by Gagne and Berliner about behavior changes as a result of experience. This theory then developed into a school of learning psychology that influenced the direction of development of educational and learning theory and practice known as the behavioristic school. This school emphasizes the formation of behaviors that appear as learning outcomes (Lestari & Yudhanegara, 2017).

Behavioristic learning theory is a school in learning theory that places great emphasis on the need for observable behavior (Nahar, 2016). Based on the explanation of behavioristic theory, the implications of behavioristic theory in the development of EBooks are the interaction of students and teachers in the application of learning media. With the EBook contains a stimulus and response in its use. Students will be more interactive and enthusiastic in using interesting EBooks.

Cognitive Theory

Cognitive theory is a theory that focuses on a person's knowledge or cognitive. In contrast to behavioristic theory, cognitive theory is more concerned with learning processes that prioritize learning outcomes. In contrast to learning theories in the behavioristic paradigm that explain learning as observable behavioral changes that arise as a result of experience, cognitive learning theory explains learning by focusing on changes in internal mental processes used in an effort to understand This mental structure includes knowledge, beliefs, skills, expectations and other mechanisms in the learner's head (Anidar, 2017). Belajar according to cognitive theory is a process or effort that involves mental activity that occurs in humans as a result of the process of active interaction with their environment to obtain a change in the form of knowledge, understanding, behavior, skills, values and attitudes that are relative and imprinted (Sutarto, 2017). Based on the explanation of cognitive theory above, the implications of cognitive theory in the development of EBooks are that learning media does not only emphasize the existence of stimulus and response, but there is an essence of material that supports improving student learning outcomes, improving student abilities, and being able to learn to learn.

Research Methodology

The research methodology used is *research and development methods.* The development model used in this study is the development model of Borg and Gall and Dick and Carey. The stages include: 1) Preliminary study, 2) Planning, 3) Media design, 4) Small group test, 5) Large group test, 6) Final media, 7) Product effectiveness test.

Data collection in this study used several instruments, including validation sheets, interview sheets and questionnaire sheets. In this development research, the data used are qualitative data and quantitative data. Criticism and advice from material experts, media experts and design experts, which can be gathered to improve the development of *Multiple Intelligence-based* e-Books. Data collection in the study was carried out using a questionnaire. Questionnaire research instruments are filled by material experts, media experts, and design experts.

To be able to find out the effectiveness of this product, researchers carried out calculations by comparing the results of the *experimental class posttest* with the control class. In carrying out this calculation, researchers use the help of SPSS software. The results of the experimental class and control class *posttest* data will be processed first so that they are normally distributed and homogeneous, then the results of the data processing will be tested using the t test.

Research Results

Due Diligence

Media Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Media	Struktur kebahasaan	80%	Sangat layak, tidak perlu direvisi
	Tampilan Media	72%	Sangat layak, tidak perlu direvisi
	Rekayasa Perangkat	72%	Sangat layak, tidak perlu direvisi
	Keterlaksanaan	70%	Sangat layak, tidak perlu direvisi

Figure 1. Media Expert Validation Results

Based on Figure 1, it can be concluded that the average of the media expert tests on existing aspects is 73.5% thus, according to the media expert test, the product made is feasible, but needs revision. The results of input and suggestions from media expert validators have been carried out on the eBook.

Material Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Materi	Isi Materi	98,75%	Sangat layak, tidak perlu direvisi
	Manfaat	100%	Sangat layak, tidak perlu direvisi

Figure 2. Material Expert Validation Results

Based on Figure 2. It can be concluded that the average of the material expert test on the aspects of material content and benefits is 99.35% thus, according to the expert test, the product made is very feasible, it does not need to be revised.

Design Expert Validation

Uji	Aspek	Skor	Keterangan
Ahli Desain	Pembelajaran	98%	Sangat layak, tidak perlu direvisi
	Kualitas Produk	100%	Sangat layak, tidak perlu direvisi

Figure 3. Design Expert Validation Results

Based on Figure 3. It can be concluded that the average of the design expert test is 99% thus according to the expert test the product design made is very feasible.

Product Effectiveness Test

In the effectiveness test, the comparison of post-test values between the experiment class and the control class uses the *Independent Sample T Test*. The data tested is the post-test value in the experimental class with the post-test value in the control class. The t-test can be done after the data is known to be normally distributed and homogeneous, so it is necessary to calculate the normality test and homogeneity test first.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelompok	Statistic	df	Sig.	Statistic	df	Sig.
Nilai IPA	Eksperimen	,192	29	,008	,935	29	,074
	Kontrol	,147	28	,124	,935	28	,081

a. Lilliefors Significance Correction

Figure 4. Normality Test Results of *Posttest* Values of Experimental Class and Control Class

Based on the figure data of 4.18 the calculation of the normality test above shows that the sig value of 0.074 > 0.05 for the post-test value of the experimental class and the sig value of 0.081 > 0.05 for the post-test value of the control class, it can be said that the post-test value of the experimental class and the control class is normally distributed data.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Nilai IPA	Based on Mean	,137	1	55	,713
	Based on Median	,004	1	55	,951
	Based on Median and with adjusted df	,004	1	47,800	,951
	Based on trimmed mean	,078	1	55	,781

Figure 5. Results of the Posttest Value Homogeneity Test of the Experimental Class and the Control Class

The figure above shows the homogeneity test calculation data, obtained sig values of 0.713 > 0.05 so that the post-test value data of the experimental class and the control class can be said to be homogeneous. Furthermore, the posttest value data of the experimental class and the control class will be carried out t-test calculations or hypothesis tests. The results of the hypothesis test using the *Independent Sample t Test* can be seen in Figure 6.

Group Statistics

	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
Nilai IPA	Eksperimen	29	86,21	8,591	1,595
	Kontrol	28	81,29	7,683	1,452

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai IPA	Equal variances assumed	,137	,713	2,277	55	,027	4,921	2,161	,590	9,253
	Equal variances not assumed			2,281	54,686	,026	4,921	2,157	,598	9,245

Figure 6. Results of Independent Sample t Test

Based on the figure above, the results of the independent sample t-test show that the value of probability or sig. (2-tailed) which is 0.027 < 0.05 which means that it is rejected or there is a difference in students H_0' science scores between the control class and the experimental class. The average post-test score in the experimental class is 8 6.21 and the average post-test score in the control class is 81.29. There is a difference in the average value difference of 4.92. Judging from the assessment criteria, the confidence is t_{Hitung} greater than the confidence value t_{tabel}, it H_0 is rejected.

The results obtained are $= 2,277$ t_{Hitung} consulted at $= 1,699$ (significance level 5% and df $= 29 t_{tabel}$), so it can be said that $>$ or $2,277 t_{Hitung} > t_{tabel}$ 1,699 which means that there is a difference in students' science scores in experimental classes using *Multiple Intelligence-based* EBooks with a control class that uses a printed book or an IPA packet book. Thus it can be concluded that there is an effectiveness in the use in *Multiple Intelligence-based* EBooks on science learning in class V SDIT As-Salaam.

Conclusions and Suggestions

Conclusion

Multiple Intelligences-based eBooks are declared suitable for science learning in elementary schools. The eBooks developed have gone through the validation of media experts, material experts and design experts. Media expert validation with a score of 73.5% belongs to the "Decent" category. Material expert validation with a score of 99.35% belongs to the "Very Worthy" category. And the design expert's validation with a score of 9 9% included the "Very Worthy" category.

Multiple Intelligence-based eBooks are declared effective for use in grade V science learning in elementary schools based on the average results of science scores of students studying using *Multiple Intelligence-based* EBooks of *86.21*. The average score is higher than the class that uses the science package book, which is 81.29. Then judging from the results of the independent sample t-test, the significance of $0.0\ 27 < 0.05$ means that H_0 it was rejected, indicating that there was a difference in students' science scores in the experimental class using *Multiple Intelligences-based* EBooks with control classes using printed book media / science packages.

Suggestion

Research and development of learning media like this requires a lot of investment and resources, so suggestions to schools to allocate a budget in the form of sufficient research funds to improve the research and development of eBooks based on *Multiple Intelligences*

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