



HOTS-Oriented E-BOOK Learning Media in Improving Students' Higher Level Thinking Abilities and Digital Literacy in Gorontalo Coastal Schools

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Abstract. 21st century education focuses on training students in digital literacy and higher-order thinking. Digital literacy needs to be introduced to students from an early age so that they are technologically literate. It is important to train students to think at a higher level so that they can think critically, creatively and be able to solve problems. Education also accommodates the needs of different students (Differentiated Education). For this reason, learning media was developed in the form of HOTS-oriented E-Books so that students are able to think at a high level and are literate in digital technology and meet the needs of students in areas that have several regional characteristics, namely in Gorontalo North, Bonebolango Regency and Pohuwato Regency. The research was conducted using several school samples in North Gorontalo, 6 schools, Bonebolango in Kabila Bone, Pohuwato in Duhiaadaa Village School, 2 schools and Popayato, 2 schools. The selected areas have student characteristics, including students who have time to study at school and students who have activities other than studying, namely helping their parents who work as fishermen. So students cannot meet the frequency of attending school as expected by their teachers. The research results show that E-Book Learning Media provides great benefits in helping students' understanding. Students who can enter class receive teacher guidance, students who cannot enter class can still study at home independently. Because students are helped by the E-book learning media because it is equipped with materials, LKPD and videos as well as assignments. So even though students are not at school because they are helping their parents at sea, students can still study in the home.

Keywords: coastal area schools, digital literacy, e-book learning media, higher level thinking skills

1 Introduction

21st century learning emphasizes students' mastery of the 6 Cs, namely critical thinking skills, creative thinking, collaboration skills, communication skills, digital literacy and environmental sensitivity. This ability will make students human resources who are able to overcome future problems, such as being able to solve problems and think at a high level to overcome problems and put forward important ideas that support them in developing skills in the 21st century era [1]. HOTS (High Order Thinking Skill) is a thinking activity that combines logic, reasoning, analysis, evaluation and creative thinking skills. The reality is that students' high-level thinking skills in Indonesia are still in the low category. This is in accordance with PISA data in the Science category in 2009. Indonesia was in 60th position out of 65 participating countries. In 2012, Indonesia was in 64th position out of 65 participating countries [2]. In 2015, Indonesia was in 62nd position out of 70 participating countries. In 2022, it will be 69th out of 81 countries. This is caused by students' weak skills in solving problems, the learning assessment system in Indonesia still uses low level questions [3].

HOTS-based learning must be embedded from an early age in school learning. This is because HOTS is the key to success in facing competition in the 21st century because this era is full of uncertainty so strong and critical thinking needs to be developed in responding to problems [4]. High Order thinking skills (HOTS) are the ability to use and process thought processes based on facts (Lie, 2020). Brookhart [5] stated in Anderson and Krathwohl's (2001) revised Bloom's taxonomy, high-level thinking abilities include the ability to analyze (C4), evaluate (C5), and create (C6). Information Technology has opened wider access to education and training, facilitated global knowledge exchange, and provided more efficient reference resources. Technology also plays a role in increasing the productivity of coastal communities and adapting to climate change [6]. So Information Technology plays an important role in increasing the capacity of coastal human resources.

In this regard, digital learning needs to be taught to students through e-book or digital book-based learning. E-books started as textbooks packaged offline which were then developed into online books. E-books and textbooks support student centered learning (SCL). The learning paradigm in schools is directed more towards students as learning subjects and teachers only act as facilitators. The advantage of e-books is that they can be used anywhere, anytime and used by anyone. Readers can access e-books online or offline [7].

Differentiated learning is a learning approach that adapts to students' needs, learning readiness, learning speed, learning style and level of understanding. Each student is a unique individual so learning methods must be adapted to their characteristics and needs [8]. The implementation of differentiated learning is carried out through the teacher's efforts to provide many choices of strategies, techniques and materials tailored to students' needs. The goal is for students to be active in the learning process and involved in more meaningful learning activities. Furthermore, it is hoped that it can improve students' mastery of the material and maximize their learning potential [9].

Students in Coastal Area Schools have characteristics and limitations compared to students in schools in areas close to urban areas. Students in the Pohuwato area, Bonebolango, North Gorontalo, especially in schools close to the sea, need help with a more flexible learning model. This is due to several things, namely the sea area makes children happier playing outside than in the classroom environment. Apart from the natural students' habit of playing in the water and boating, their parents' work as fishermen also often requires children to help their parents when it comes time to harvest fish. This results in children often not participating in lessons at school during fishing season. Boys usually often miss class, compared to girls. This is the reason why more boys drop out of school than girls. Therefore, this problem needs to be overcome with differentiated learning. Several types of differentiated learning can be pursued, for example individual learning, cooperative learning, project-based learning, and technology-based learning.

Apart from that, one way to overcome this problem is to use several media so that children who are able to attend school can learn with the help of teachers, while children who are unable to attend class can still take part in lessons by doing their homework at home after they have finished helping their parents. at sea. The efforts made in this research are to overcome inequalities in differentiated learning by providing the necessary resources and technology, providing special assistance to students who need it, and motivating students to participate optimally in learning.

2 Method

2.1 Research Population and Sample

The population in this study were coastal elementary schools in Pohuwato district, especially Torosiaje and Popayato villages, North Gorontalo district and Bonebolango district which are close to sea and coastal waters. The research sample was 6 elementary schools located in coastal areas in North Gorontalo Regency, Bonebolango Regency and Pohuwato Regency. The sample schools were 6 classes each at SDN 1 Ponelo, SDN 6 Kabila Bone, SDN 6 Duhiadaa, SDN 9 Duhiadaa, SDN 6 Popayato and SDN 6 Popayato.

2.2 Research Subjects

Research subjects in Pohuwato Regency at SDN 6 Duhiadaa and SDN 9 Duhiadaa grade 6. Research subjects were 16 students who were interested in learning with E-books and 24 students who were interested in studying with books with teacher guidance. The research subjects at Popayato were class VI students at SDN 04 and SDN 09 Popayato. 17 students were interested in learning using e-books and 22 students studied using textbooks with teacher guidance. Research subjects in North Gorontalo District were 16 people who chose to study using E-Books and in Bonebolango District as many as 19 people studied using E-books.

2.3 Research Stages

This research is divided into 2 stages. Firstly, the research was carried out in three areas by implementing science learning using textbooks that train students to think at a higher level. Further research was carried out in 3 regions by implementing science learning using e-books which train students to think at a higher level. E-Books present learning activities that accommodate visual, audio-visual and kinesthetic student learning styles.

2.4 Research Instrument

The research instruments used are the Learning Implementation Plan (RPP), Offline Books containing material and Student Worksheets and digital books or E-Books and high-level thinking evaluation tools. The instrument for measuring students' digital literacy is in the form of a questionnaire which is categorized into a Likert scale which uses four alternative scales, namely: SS (Strongly Agree), S (Agreed), TS (Disagree), STS (Strongly Disagree).

The test instrument used is a HOTS-oriented test which tests Analysis, Evaluation and Creation skills. The assessment is in the form of a score with a value of 0 if wrong and 1 if correct.

2.5 Data Analysis

Validity and Reliability Test Validity test is calculated by correlation test. The statement in the digital literacy questionnaire is said to be valid if the calculated R value $>$ Rtable. Determination of the Rtable value is based on the number of participants. The number of participants in the empirical validation was 30. If seen based on the distribution table of r values, the significance table is 5% and 1%, then the r table value is 0.361. Based on the table above, it can be concluded that of the 20 digital literacy questionnaire statements, 15 statements were declared valid and 5 were invalid. Next, it is analyzed using the following formula:

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)}}$$

Information:

- r_{xy} = Correlation coefficient between variable X and variable Y, two variables which are correlated.
- X = Score obtained by students on the test items to be tested for validity.
- Y = Total score obtained by each student.
- $\sum X$ = Number of scores in distribution X.
- $\sum Y$ = Number of scores in the Y distribution.
- $\sum X^2$ = Sum of squares of scores in the X distribution.
- $\sum Y^2$ = Sum of squares of scores in distribution Y.
- N = Number of students (Sugiyono, 2007).

The decision rules with a significance level of 5% are as follows:

- If $R_{count} > R_{table}$, then the item is **Valid**.
- If $R_{count} < R_{table}$, then the item is **Invalid**.

Reliability testing aims to see the quality of variables when used in data collection. Based on calculations using SPSS 25 for Windows, the results obtained can be seen in Table 1.

Table 1. Reliability Test of Digital Literacy Questionnaire

Cronbach's Alpha N of Items	
0,768	15

Based on table 1, the Cronbach's alpha value is more than 0.6, namely 0.768. Thus, the 15 digital literacy questionnaire items are reliable.

Presentation of Questionnaire Results The digital literacy questionnaire calculates the percentage of achievement, the formula used is:

$$\frac{\text{Total Score}}{\text{Maximum Score}} \times 100\%$$

(Sugiyono, 2007).

Table 2. Questionnaire Indicator Criteria

Percentage (%)	Criteria
0 - 20	Very less
21 - 40	Not enough
41 - 60	Enough
61 - 80	Good
81 - 100	Very good

Higher Order Thinking Test Data analysis uses Independent sample T-test which is tested using SPSS 25. Sugiyono explains that the test criteria are if the calculated t value $>$ t table (0.05) then the null hypothesis is rejected, secondly if the calculated sig t value $<$ t table (0.05), then the null hypothesis is accepted. Furthermore, if there are differences, analysis is carried out with N-Gain to see further improvement in learning outcomes. High level thinking abilities are obtained from the results of pretest and posttest N-gain calculations. The N-gain value is obtained from calculations using the following formula:

$$g = \frac{\text{Posttest Score (\%)} - \text{Pretest Score (\%)}}{\text{Ideal Score} - \text{Pretest Score (\%)}}$$

Information

- **High N-Gain:** $0.71 < g < 1.00$
- **Medium N-Gain:** $0.31 < g < 0.70$
- **Low N-Gain:** $g < 0.30$

(Hake dalam Herlanti, 2015)

3 Result and Discussion

3.1 Result

Digital Literacy of Students Who Learn by Utilizing E-Book Learning Media is Better Compared to Students Who Study with Textbooks. Empirical validity of the digital literacy questionnaire. Based on 20 questions, after conducting an empirical validity test, 15 questionnaire items were declared valid with a validity value between 0.5 - 0.876. So in this research 15 Digital Literacy items were used. Questionnaire reliability. Based on calculations using SPSS 25 for Windows, the Cronbach's Alpha value was more than 0.6, namely 0.768. So the 15 digital literacy questionnaire items are reliable. There are 16 students in Pohuwato Regency who study using E-Book learning media at SDN Duhiadaa and 22 students at SDN Popayato. There are 24 students studying using textbooks at SDN Duhiadaa and 17 SDN in Popayato.

Table 3. Group Statistics at SDN Duhiadaa

	Teacher Teaching Methods	N	Mean	Std. Devi- ation	Std. Error Mean
The Value of Digital Textbook Literacy of Student in Duhiadaa	Textbook	22	39.19	8.414	1.650
	E-Book	16	54.75	5.398	1.349

The average score for students' digital literacy skills who studied with textbooks was 39.17, while with e-books it was 54.75. There is a difference in the average digital literacy abilities of students who use textbooks and e-books. Next, the t-test is the Independent Samples Test, Sig value. Leven's test for equality of variances is 0.135 \geq 0.05, which means that the data variance between textbooks and e-books is homogeneous. Based on the Independent Samples Test Output table in the Equal variances assumed value of Sig. (2-tailed) is 0.00 \leq 0.05, then H0 is rejected. H1 is accepted or there is a significant difference between the average Digital Literacy of students who study with textbooks compared to E-Books. The difference in the Mean Difference value is -15.558. (95% Confidence

Table 4. Group Statistics at SDN Popayato

	Teacher Teaching Methods	N	Mean	Std. Deviation	Std. Error Mean
The Value of Digital Literacy of Student in Popayato	Textbook	22	25.36	2.536	.541
	E-Book	17	50.82	3.377	.819

Interval of the Difference Lower Upper). The next analysis is comparing the Digital Literacy of Students in Pohuwato Regency, namely in Popayato Village.

The average digital literacy score for students using textbooks is 25.36, while digital literacy for students using E-books is 50.82. There is a difference in the average digital literacy of students between students who study using textbooks compared to those who use e-books. Followed by the following Independent samples t test.

Table 5. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
								Lower		Upper
Learning Outcome Result	Equal variances assumed	0.00	0.983	-26.912	37	0.00	-25.460	946	-27.377	23.543
	Equal variances not assumed			-25.941	28.8	0.00	-25.460	981	-27.468	23.452

Based on the results of the analysis of the sig. Leven's test for equality of variances is $0.983 > 0.05$, meaning that the data variens between textbooks and e-books is homogeneous. The results of the Independent Samples Test in the Equal variances assumed section show the value of Sig. (2-tailed) of $0.00 < 0.05$, it is concluded that H_0 is rejected. H_1 is accepted. It is concluded that there is a significant (real) difference between the average digital literacy of students who study using textbooks compared to those who use e-books. Mean Difference is -25.36. and the difference is -27,377 to -23,543 (95% Confidence Interval of the Difference Lower Upper).

Higher Order Thinking Skills (HOTs) of Students Learning Using E-Books Implemented in 3 Districts

Before being used to test higher-order thinking abilities, higher-level thinking questions are previously tested for empirical validity. The validity of the HOTs questions is 0.6 and the reliability of the HOTs questions shows that the Cronbach's alpha value is more than 0.6. Next, it was analyzed using the Paired Samples Test.

Table 6. Statistical Summary of Test Results

	Mean	N	Std. Deviation	Std. Error	Mean
Bonebolango SDN 6 Kabila Bone Pre Test 1	26.58	19	8.827	2.025	
Post Test 1	74.47	19	5.985	1.373	
Gorontalo Utara SDN 1 Ponelo Pre Test 2	26.32	19	8.635	1.981	
Post Test 2	65.42	19	8.790	2.016	
SDN 9 Duhiadaa Pohuwato Pre Test 3	33.75	16	12.042	3.010	
Post Test 3	75.63	16	10.308	2.577	

Based on descriptive statistical analysis, the average value of students' higher order thinking abilities (HOTs) in 2 districts, namely Kabila Bone, Bonebolango District and Duhiadaa Pohuwato, is higher than students in Ponelo, North Gorontalo.

Table 7. Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval	t	df	Sig. (2-tailed)
				Lower Upper			
Pair 1 Pre Test 1	-47.895	5.087	1.167	-50.347 -45.443	-41.040	18	.000
Post Test 1							
Pair 2 Pre Test 2	-39.105	8.212	1.884	-43.063 -35.147	-20.758	18	.000
Post Test 2							
Pair 3 Pre Test 3	-41.875	12.764	3.191	-48.676 -35.074	-13.123	15	.000
Post Test 3							

Hypothesis:

H1 = There is a difference in the average learning outcomes of the pretest and posttest.

Information:

Pair 1: SDN 6 Kabila Bone, Kabupaten Bonebolango

Pair 2: SDN 1 Ponelo, Kabupaten Gorontalo Utara

Pair 3: SDN 9 Duhiadaa, Kabupaten Pohuwato

Higher Order Thinking Abilities (HOTs) of Students Learning Using Textbooks Implemented in 3 Districts Before being used to test higher-order thinking abilities, higher-level thinking questions are previously tested for empirical validity. The results of the analysis show that the validity of the HOTs questions is 0.6 and the reliability of the HOTs questions shows that the Cronbach’s Alpha value is more than 0.6. The high-level thinking abilities of students in 3 schools in 3 districts who studied using textbooks with teacher guidance were analyzed to see the effect on students’ higher-order thinking abilities.

Table 8. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test 1	17.14	7	11.127	4.206
	Post Test 1	58.57	7	8.997	3.401
Pair 2	Pre Test 2	29.44	18	9.376	2.210
	Post Test 2	65.56	18	9.218	2.173
Pair 3	Pre Test 3	27.08	24	7.506	1.532
	Post Test 3	36.67	24	12.394	2.530

Information:

Pair 1: Bone Bolango

Pair 2: Gorontalo Utara

Pair 3: Pohuwato

The results of the statistical analysis of the paired samples test, with a confidence level of $\alpha = 0.05/2$, yielded a p-value of 0.000, which is smaller than the confidence level of $\alpha = 0.05$. Furthermore, the t_{count} values for each district are -10.253, -11.879, and -3.358, which are greater in absolute value than the corresponding t_{table} values of 2.446, 2.109, and 2.068. Based on these results, it can be concluded that H_0 is rejected and H_1 is accepted, indicating a significant effect of textbook use in each district, specifically at SDN 6 Kabila Bone, SDN 1 Ponelo, and in Pohuwato.

3.2 Discussion

Students’ Higher Level Thinking Abilities who have the opportunity to study in the classroom with teachers using textbooks

Based on groups of students who have many opportunities to study with teachers in class, they use textbooks accompanied by teachers in class. Students work on student worksheets in the textbook. Researchers try to compare higher thinking abilities in the three areas. Based on descriptive statistical analysis, the average value of higher order thinking abilities (HOTs) for students who study using textbooks in North Gorontalo district is higher than students in Kabila Bone, Bonebolango District. The lowest average for students in Pohuwato. The

textbooks that have been prepared are designed to train students to think at a higher level so that they can be used in face-to-face learning with teachers. Students in North Gorontalo are more able to learn in class. So their higher level thinking abilities are also better compared to the two groups who did not have much opportunity to learn in the classroom.

The advantage of learning using textbooks is that it accommodates students' visual learning styles by displaying attractive images in HOTS-oriented textbooks. However, the weakness is that students who only learn using textbooks, their digital literacy skills are not trained. So learning can be enriched by using e-book learning media [10].

Students who study with e-books improve their digital abilities and higher level thinking

Digital literacy is the user's knowledge and skills in utilizing digital media, such as communication tools, internet networks and so on. User skills in digital literacy include the ability to find, work on, evaluate, use, create and utilize it wisely, intelligently, carefully and precisely according to its use of the E-Book [11]. Research data shows that students who learn with assistance make students capable of digital literacy. Digital literacy skills use 4 indicators and 13 sub-indicators. Ability to search on the internet, Ability to use hypertext directions, Ability to organize knowledge (knowledge assembly), Ability to organize knowledge (knowledge assembly). This shows that activities related to digital literacy really support digital literacy students [12]. Learning is carried out online, namely via applications or the web. Students can search for teaching materials from trusted sources on the internet. Digital literacy at home is carried out through information search assignments using a browser. Listen to material from official streaming services and listen/view videos in E-Books. Students use cellphones connected to the internet to do assignments or work. Sending school assignments via WA.

By implementing learning using E-Book media, learning takes place effectively. Students can still learn after helping their parents during the fish harvest season. Next, students work on existing assignments which can be downloaded in the E-Book. Meanwhile, students who are able to enter school carry out learning in class with the help of teacher assistance in understanding assignments and material concepts [13]. Furthermore, students who are unable to attend can enrich their knowledge with the guidance of the class teacher. In this way, students' Digital Literacy increases through digital learning with E-book media. The advantage of learning with e-books is that they accommodate the needs of students who have visual, audio-visual and kinesthetic learning styles. The learning carried out in the Pohuwato area boils down to practical learning about planting mangroves in the waters at low tide in the afternoon. So that students in the Pohuwato area experience more meaningful learning [14].

So according to research data, students in Bonebolango and Pohuwato districts who study with HOTS-oriented E-Books show higher digital literacy skills compared to students who study using E-books in the North Gorontalo region. This research has accommodated each student who has different learning charac-

teristics [15] [16]. By providing services according to student needs, this can help students to progress and develop their learning. Such as the condition of schools in three coastal districts. Students in coastal areas are characterized by being less interested in studying in the classroom. One solution is to accommodate the needs of students who prefer activities outside the classroom by doing lots of practical activities outside the classroom. This is also in accordance with the research findings of [6] that the appropriate learning model for children's education in coastal areas is an interactive learning model and cooperative learning system, with child-centered learning indicators in coastal areas, organizing active learning in coastal areas. Mobilizing education through direct experience with objects in coastal areas that are meaningful, interesting and functional in coastal areas. In this regard, this research was carried out by applying the discovery learning model and providing direct experience to students by observing the surrounding environment, especially coastal natural resources in the school environment and students' homes which are close to coastal ecosystems, especially mangroves [17].

Students in the Pohuwato and Bonebolango areas need more help from E-Book learning media to help their understanding of concepts when they are not in school and gaining learning experiences through kinesthetics by doing field practice. One of the things the students did was plant mangrove seedlings on the beach. As Munandar & Rizki [18] state, textbooks that integrate technology are more practical, easy to access, and do not require a lot of money. This makes students more interested and motivated to read anywhere. Moreover, textbooks in research are development products designed to train high-level thinking skills [19] [20] [21].

4 Conclusion

E-Book Learning Media provides great benefits in helping students' understanding. Students who can enter class receive teacher guidance, students who cannot enter class can still study at home independently. Because students are helped by the E-book learning media because it is equipped with materials, LKPD and videos as well as assignments. So even though students are not at school because they are helping their parents at sea, students can still study in the home.

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