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Implementation of Android-Based Blended Learning for Improving Learning Outcome and Information Literacy Skill of Students

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Abstract: Rapid development of information and communication technology should be accompanied by appropriate changes in learning activities. Implementation of Blended learning is considered providing space for students to learn both offline and online. The use of android media in the activity will facilitate students to learn the materials in a specific, interesting, and easy way. This study aimed to examine the improvement of learning outcome and information literacy skill of students. Research method applied was *Quasi Experimental Design* with *Non-Equivalent Control Group Pretest-Posttest Design*. This study was conducted from June to August 2022 in Senior High School 5 Langsa. Population in this study consisted of 60 students, with class sample $X_{.1}$: 29 students. Sampling technique applied was *purposive sampling*. Research instruments included Multiple-Choice Test to investigate learning outcome of students and Rubric Assessment for information literacy skill. Data in this research were statistically analyzed using *Paired samples t-test;* to analyze learning outcome of students, *Cluster,* and Descriptive test to analyze the indicators of information literacy skill of students. Study result of learning outcome of students was expressed as value (sig) of 0.00 < (α) 0.05, hence Ho was rejected and Ha was accepted. Therefore, implementation of android-based Blended Learning was found to significantly improve learning outcome. Furthermore, study results about information literacy skill showed that students: Find and select information (56.77%), Identify the truth of information (62.58%), Retell the information in writing (62.58%), and Communicate information in a presentation (61.29%) with 3 Indicators of Good Category and 1 Moderate Category. To conclude, habituation of learning activity through android-based blended learning is necessary for students of Senior High School 5 Langsa to strengthen their information literacy skill.

Keywords: Android; Blended Learning; Information Literacy Skill; Learning Outcome

Introduction

The development of digital information in the industrial revolution 4.0 era has an apparent implication in the implementation of learning activity in Senior High School. The development of digital technology insists the high school level education on adapting to this situation and producing higher quality of learning (Insani & Hafida, 2021; Hasan et al., 2021). Along with the digital phenomenon, every student is familiar to use technological devices in learning activity. The use of digital technology provides fast and unlimited access to information, resulting in a variety of independently obtained information. Information disclosure has a positive impact on learning effectiveness). On the other hand, information disclosure has a negative impact on students who face difficulty in filtering the truth of information from received sources (Sukirno et al., 2020).

Observation results show that students use *smartphone* during learning activities in the classroom. Guided by the teacher, students in the class dominantly use *Google* search to find source of information on the

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internet. However, when learning at home, they search for the source of information related to the materials learned at school independently, resulting in difficulty to dig for information without teacher guidance. Thus, the materials obtained by students are far too broad, causing them to not focus on the materials being studied. This situation requires a learning model that is able to facilitate students in independent learning, such as android-based blended learning. However, unavailability of technology-based facility is still found besides the considerably low usage of technology-based learning media (Fransisca & Yunus, 2021). Students need facilities for learning activity like *blended learning* to learn anywhere and anytime (Arnidah et al., 2022).

Blended learning has been combined with various media, such as android (Mahendri et al., 2022) Google Classroom (Talibo et al., 2022), Edmodo (Sefriani et al., 2021), E-Learning, Video, and Podcast (Lestari et al., 2021). It was found that blended learning could effectively improve learning outcome (Sidabalok & Sinaga, 2021 ; Khairal Abd et al., 2022). Android-based blended learning encourages students to find information about learning materials in an easy, directed and specific way. Android functions as learning facility to access learning materials and educative information (Aswar et al., 2021). Android apps are widely used as learning media to improve learning process and outcome (Muhimmatin & Jannah, 2021).

Blended learning is implemented through a proportional combination of face-to-face (offline) learning in the classroom and online learning using digital technology devices to achieve learning objectives. Blended learning is possibly implemented by use of android-based collaborative asynchronous media to enhance information literacy skill. Improvement of students' information literacy skill can be achieved by providing digital learning resources in order to access the information (Gani et al., 2020; Fauziah & Lestari, 2018). This type of learning is more flexible to apply online, hence students will learn independently to understand the materials deeply (Zulhamdi et al., 2022).

Information literacy skill and learning outcome of students achieved will result in knowledge and understanding of students that will further encourage them to achieve learning outcome. Information literacy is a combination of students' skills to search for information needed, evaluate it, and use the information correctly (Rachmawati & Agustine, 2021). Students should master the information literacy skill to filter the information received. Later, the information obtained is used to solve problems faced. Information literacy skill, including critical thinking and problem-solving skill, is necessary for students to develop their potential (Suroya, 2021). Based on the explanation above, this study focused on investigating how the result of android-based blended learning implementation improve the cognitive learning outcome and information literacy skill of students in Senior High School 5 Langsa. This research is very important to do to find out the increase in student learning outcomes on the use of Android-based digital media. As well as obtaining information on students literacy skills in using learning models that integrate Android-based ICT technology devices as learning media to class.

Method

This research applied *Quasi Experimental Design* with *Non-Equivalent Control Group Pretest-Posttest Design*. The experimental design of this study was aimed to investigate learning outcome and information literacy skill of High School students through blended learning based on android application. Experimental design is presented in Table 1. This study was conducted from June to August 2022 in SMAN (Public Senior High School) 5 Langsa, Langsa, Aceh Province. Population in this study consisted of 60 students of class X, with class sample $X_{.1}$: 29 students. Sampling technique applied was *purposive sampling*. Technique of data collection in this research was performed using 2 main instruments, namely: Rubric Assessment, that is scoring method with rating criteria to measure pre-determined performance of students and is prepared based on standard and clear achievement indicators. Rubric Assessment of information literacy is adapted from rubric assessment (Aghazadeh, 2019). Question in Multiple-Choice test is assessment instrument of students' cognitive learning outcome after studying the Biology Subject, Chapter of Biodiversity. Questions were of C3 - C6 level in Bloom's Taxonomy (Anderson et al., 2001). Data in this research were statistically analyzed using *SPSS Software for Windows 21*, *Paired samples t-test;* to analyze learning outcome of students, and Descriptive test to analyze the indicators of information literacy skill of students.

Table 1. Experimental Design

Group	Pre-Test	Treatment	Post-Test
$X_{.1}$	Q_1	T_1	Q_2

Description:
Q_1 , : Pre-Test
Q_2 , : Post-Test
T_1 : Blended Learning + android

Results and Discussion

Learning Outcome

Learning outcome before the implementation of android-based blended learning obtained a pre-test score: 47,93. However, after android-based *blended learning* implementation, the post-test score: 88.62, as shown in Figure 1. Result of Kolmogorov-Smirnov test for Normality indicated that data were normally distributed following the value (sig) of 0.12 > (α) 0.05.

Moreover, the *Paired samples t-test* resulted in value (sig) of 0.00 < (α) 0.05, Ho was rejected and Ha was accepted. Thus, implementation of android-based blended learning significantly improved learning outcome. The test result is provided in Table 2.

Blended learning in this study was conducted by combining the activity of face-to-face learning in the classroom and online learning. In the classroom, students learnt the material according to teacher's explanation, later, when students learnt online at home or at school, they accessed teaching material on their smartphone. This learning activity will strengthen students' conceptual understanding of the material they have learned to be further stored in their memory. Hence, students could answer the questions in the post-test easily since they have clearly understood the concept of biodiversity. It is in line with (Muzakkir et al., 2018) who mentioned that blended learning could support online learning and (Suparini et al., 2020) provide opportunity for students to find online learning materials using android smartphone. Study result showed that blended learning implementation successfully improved learning outcome (Sidabalok & Sinaga, 2021; Khairal Abd et al., 2022) and higher-order thinking skill of students (Hadiprayitno et al., 2021). Successful learning is reflected by the students' learning outcome (Nabillah & Abadi, 2019) Therefore, Blended learning is greatly effective and efficient to be implemented at school (Sukirman et al., 2022).

Learning outcome of students was also improved in the post-test following the implementation of blended learning activity integrated with android as learning media. Learning materials provided in android media can be accessed offline using students' smartphone. Furthermore, android media can be easily accessed and operated by students, thus encouraging them to learn by reading the material. This is in line with (Elci et al., 2021) that android-based biology learning can be learned anytime and anywhere. Besides, android application is easy to operate and attractive. Android can transform abstract concept to something that is easily visualized (Ramdani et al., 2020). Attractive visualization on the android menu can encourage learning activity (Fitriana et al., 2021) and reduce misconceptions (Hamid & Haka, 2021).

Information Literacy Skill

Information literacy skill of students in this study was observed according to 4 indicators. Based on the study result, it is classically obtained that: Skill of finding information (56.77%) belonged to moderate category, Skill of identifying the truth of information (62.58%) included in good category, Skill of retelling the information in writing (62.58%) was within good category, and Skill of communicating information orally (61.29%) was under good category.

Information literacy skill was divided into 4 main groups, namely: Group 1 consisted of 7 students, with a positive (+) value for all criteria, confirming that no new information found on the application. Group 2 consisted of 2 students, respectively obtained negative (-) value for all criteria, hence they were able to identify the truth of information. Group 3 consisted of 12 students, respectively obtained negative (-) value for all criteria, assumed to have the ability to retell the information orally and in written form. Group 4 consisted of 8 students, respectively obtained negative (-) value for all criteria, considered having skill of communicating information both orally and in written form, as provided in Table 3. Each indicator of information literacy skill obtained significance value of (sig.0,00), (sig.0,01), (sig. 0,00), and (sig. 0,00) < (α. 0,05), respectively, hence it is concluded that Ho was rejected and Ha was accepted. It shows that the digital literacy skill of the four groups of students were significantly difference. The significance of Cluster test is shown in Table 4.

The result of students' information literacy skill was reflected by 3 indicators under the good category, as seen from the learning habit of students using android smartphone as learning facility in the classroom. Information skill is a competency that musbe mastered by students in finding source of information, filtering information source, and using the information in accordance with the concept of learning material. According to (Handayani et al., 2022), the strategy to strengthen the Information and Communication Technology (ICT) literacy skill is done through the implementation of classroom learning that facilitate students using ICT-based media. One indicator of the lowest level in information literacy skill is the students' ability to find and select information. It is posible since students are used to being guided by teachers when searching for source of information on the internet. Information literacy skill is the ability to use information to solve problems and improve learning outcome of students (Riski et al., 2018). Information literacy skill in learning includes the ability to determine the access to information, combine information, and use information (Winoto & Sukaesih, 2022). Therefore, habituation of finding the source of information from android smartphone is necessary for students to improve their skill.

Table 2. Paired samples t-test

Pair	Mean	Std. Deviation	Std. Error Mean	95% confidence Interval		t	df	sig
				Lower	Upper			
Pre Test – Post Test	40.68	14.73	2.66	35.22	46.15	15.24	28	0.00

Table 3. Cluster Test for Grouping Students according to indicators

Indicators	Final Cluster Center			
	Group 1	Group 2	Group 3	Group 4
Cluster Membership	7	2	12	8
Find and select information	1.62	-0.46	-601	-322
Identify the truth of information	1.00	-0.97	-391	-240
Retell the information in writing	0.33	-0.92	-0,09	-1.12
Communicate the information orally in a presentation	0.30	-299	-795	-1.08

Table 4. Significance of Cluster Test

Indicator	Cluster		Error		F	sig
	Mean Square	df	Mean Square	df		
Find and select information	5.77	3	0.469	28	12.31	0.00
Identify the truth of information	4.33	3	0.630	28	6.87	0.001
Retell the information in writing	5.57	3	0.492	28	11.31	0.00
Communicate the information orally in a presentation	6.00	3	0.444	28	13.49	0.00

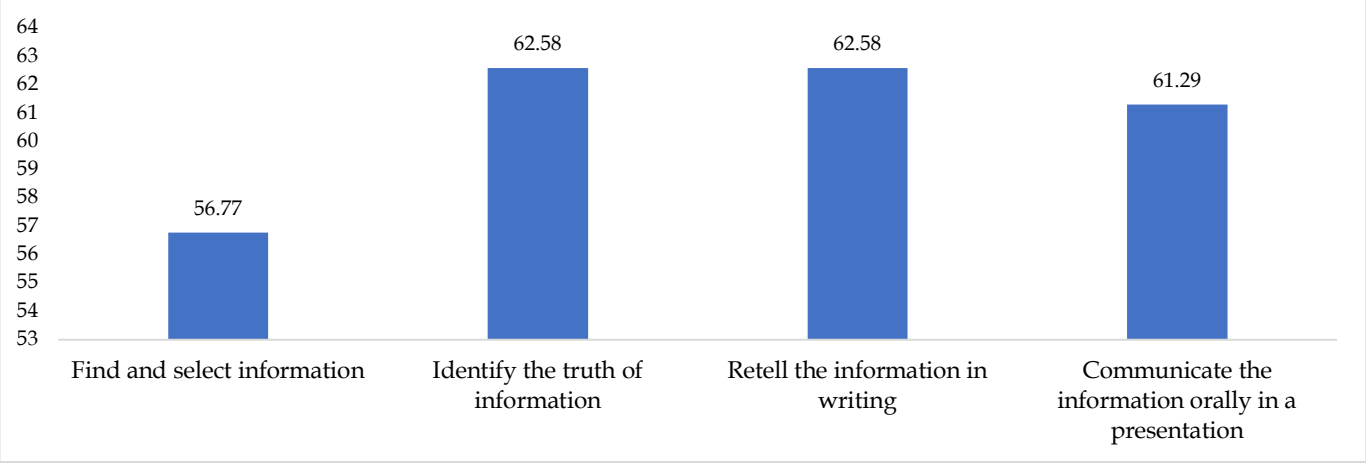

Figure 2. Information Literacy Skill

Conclusion

Implementation of android-based blended learning was found to significantly improve learning outcome. Study results about information literacy skill of students showed that the indicators of Identify the truth of information, Retell the information in writing, and Communicate information in a presentation were included in Good Category, while Find and select information belonged to Moderate Category. Moreover, habituation of learning activity through android-based blended learning is necessary for students of SMAN 5 Langsa to strengthen their information literacy skill.

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