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Enhancing critical thinking skills for low-grade elementary school students using mobile apps

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Abstract

This research was motivated by elementary school students' low critical thinking ability and their familiarity with gadgets. They use gadgets with various Android-based mobile applications that can be easily downloaded. Thus, this research was designed using an experimental method by explaining to the respondents the instructions for using SBL Apps before operating the application. The population was all lower grade elementary school students in Sumedang Regency, West Java, Indonesia. A random sample of 16 third graders of SDN 1 Citimun was selected. The students were given an explanation first, about how to use SBL Apps, and then they operated the application independently. Data were collected through observation, interviews, and questionnaires, and then processed by qualitative and quantitative analysis. The research results showed that 1) students' responses were positive and significant toward SBL Apps, and 2) the use of SBL Apps could significantly improve students' critical thinking skills.

Keywords: Enhancing, Critical thinking; Low-grade students; Mobile Apps, SBL Apps

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1. Introduction

1.1. Conceptual or Theoretical Framework

The 21st century has brought many changes, one of which is the use of digital technology in various sectors of life, including education, especially in elementary schools (Zarifsanaiey et al., 2022; Greve et al., 2022; Prescott et al., 2018). In the learning process in elementary school, teachers have started to use technology as a tool and media in the classroom, such as using laptops, projectors, and others. Furthermore, the COVID-19 pandemic demands changes to prevent the transmission of the virus. Thus, teaching and learning activities that were initially carried out in classrooms have been moved to virtual spaces. Some of the virtual learning activities are done using WhatsApp group, Google Classroom, Zoom Meeting, or other supporting online learning applications (Voshaar et al., 2022; Acaroglu et al., 2022; Mendes de Oliveira et al., 2021; Lau et al., 2021; McCutcheon et al., 2016).

As a result, parents often do technology update, such as buying new laptops or other gadgets to facilitate their children's needs in participating in the online learning process organized by teachers and school. Cellular credits and internet plans have become a basic need and the fuel that must be filled so that online learning can run properly. The impact on children is that they did not have personal gadgets before, but eventually, like it or not, parents are forced to allow ownership of these gadgets. In terms of age, they are still children, so the use of gadgets must always be supervised and restricted (Undheim, 2021; Sørenssen & Bergschöld, 2021; Wilson, 2016).

Initially, children have gadgets so they can follow the learning process organized by the teacher and school, and eventually they became proficient in operating the gadgets. Outside the learning hours, they became acquainted with the features and applications available on the gadgets and the internet (Fuentes & Sörum, 2019). As a result, children are familiar with various kinds of games, both online and offline, which previously had to be downloaded on their devices. Hence, it cannot be denied that even children, who are around 7 years old, the age of lower grade elementary school students, are already technology proficient in this matter. In fact, at first, parents, who were supposed to provide supervision in using gadgets, were actually less proficient in operating them. This is a challenge for parents and schools, in this case academics.

Figure 1. The Process of Introducing Children to the Digital World

Figure 1 illustrates the process of introducing children to the digital world, which results in them being very intimate with the gadgets they own. This resulted in many new cases have arisen in children

and one of them is the addiction to gadgets (Kayis et al, 2021; Haand & Shuwang, 2020; Mannion & Nolan, 2020). Gadget addiction is a behavior of using gadgets excessively and has interfered daily life activities due to uncontrolled use of gadgets (Kayis et al, 2021; Haand & Shuwang, 2020; Mannion & Nolan, 2020). This phenomenon resulted in the emergence of another phenomenon, namely the term "*Kaum Rebahan*" (literally, the lying-down people) in children. Look at Figure 2 below.

Figure 2. "*Kaum Rebahan*" in Children (Source: Republika.co.id, 6 February 2021)

The term "*Kaum Rebahan*" refers to people who prefer to relax and lie on the bed rather than fill their time with positive and productive things (motor activities) (Rahmat, 2021; Fadilah & Yohandi, 2021; Makinuddin et al., 2020). This might be the result of the Indonesian government's policy to reduce activities outside the home as an effort to prevent the transmission of COVID-19. Therefore, against this phenomenon, the world of education should be able to take on the challenges and opportunities so that they can unite and collaborate with their digital activities. So that, the "*rebahan*" activities that children do become positive.

Figure 1 provides an explanation of how children get to know the digital world and the internet in general. There are many social networking applications and children are familiar with them and proficient in using them, one of which is the Google Play Store application. This should also be a challenge for the world of education, so that Google Play Store does not only provide games for entertainment, but also educational games for children. So that, it is expected that while lying down and playing, the children are actually doing the learning process. One of the applications developed is SBL Apps.

SBL Apps or situation-based learning applications are Android-based applications available on the Google Play Store aims at training children critical thinking skills. This application is the actualization of a learning model that was developed in several stages. The learning model packaged in this platform is a situation-based learning model that has stages of observing and problem posing. This application is a mobile platform that is user-friendly for students to analyze situations that often arise in the surrounding environment and help them to improve their problem posing skills, which are packaged in an interesting way. In addition, this application provides a variety of situations with various levels of difficulty, which is equipped with a discussion about the situation presented. SBL Apps are also equipped with voice features that make it easy for users to operate them (Isrok'atun et al., 2021; Riry, 2021).

Figure 3. SBL Apps Display

Training children in critical thinking skills is significant in today's era because lower grade students' critical thinking skills, are still in the low category (van Peppen et al., 2022; Aloisi & Callaghan, 2018; Hjerm et al., 2018; Bearman et al., 2016). Meanwhile, with their digital background, it is possible for them to get a lot of information easily from various digital platforms from their gadgets. However, not all information is guaranteed to be true, so it has the potential to give rise to hoax news with all its consequences (Collins et al., 2021; Ribeiro Bezerra, 2021).

Lower grade students need to be equipped with the knowledge on how to filter the information they get from the internet with the hope that they can be observant in distinguishing right and wrong information by introducing SBL Apps. SBL Apps has several levels, ranging from easy, medium, to difficult levels with each level having activities of 1) observing, 2) selecting information, 3) choosing a question, and 4) clarifying information in the discussion section.

1.2. Related Research

Several relevant studies with this research have been conducted by Booton et al. (2021). They found out that teaching assisted by mobile touch screen applications has presented new opportunities in language learning activities for children. Their research involved respondents aged 3 to 11 years, which resulted in the conclusion that the use of mobile touch screen applications presents augmented reality (AR) moments for children and can improve the quality and quantity of speaking. Therefore, the use of this touch screen application can increase children's motivation in learning languages.

Iskrenovic-Momcilovic (2020) investigated the contribution of using mobile applications in botanical fieldwork to the quality and resilience of Natural Sciences and Society subjects, compared to multimedia teaching for fourth graders of primary schools. This research involved 120 students, divided into two groups: a control group, who was taught the principles of multimedia teaching with the help of a digital herbarium; and an experimental group, which was taught through botanical fieldwork, with the help of the PlantNet Plant Identification mobile application. The results showed that the use of mobile applications in botanical fieldwork contributed to the higher quality and durability of students' knowledge compared to multimedia teaching at the cognitive level: analysis, evaluation and synthesis.

Meanwhile, research by Lu et al. (2014) describes a project of developing and using mobile applications to learn Chinese as a second language in bilingual elementary schools. This application is

designed for Apple iPod Touch technology with the aim of facilitating learning a basic set of 200 Chinese characters. This project is a coordinated effort of experts, including instructional designers, software engineers, Chinese language experts, and classroom teachers, to develop Chinese character learning applications. The findings revealed how the project team explored teacher and learners experiences in specific contexts, developed an understanding of the teaching-learning needs for Chinese language learning, and the importance of using applications in education.

1.3. Purpose of the Study

The purposes of this research are to find out:

1. How do low grade elementary school students operate SBL Apps?
2. What are low grade elementary school students' opinions on the use of SBL Apps?
3. How can SBL Apps train and improve the critical thinking skills of lower grade elementary school students?

2. Method and Materials

2.1. Research Model

This research employs experimental design, in which the treatment was given to one group of students. The students were low grade students, who were given an explanation of the instructions for using SBL Apps. When they feel they have understood well how to use SBL Apps, they were asked to operate and explore the application.

The description of the experimental design is as follows.

	Treatment	Questionnaire Measure
Experimental group:	X	O

2.2. Participants

The population in this research was all lower grade elementary school students in Sumedang Regency, West Java, Indonesia. The samples were randomly selected and 16 third graders at SDN 1 Citimun consisting of 7 male students and 9 female students were selected. They were given an explanation first, about how to use SBL Apps, and then they operated the application independently.

2.3. Data Collection Tools

Questionnaire, interview and observation were used as the research instruments. The first two instrument were validated by two experts who were lecturers with a doctoral degree at Universitas Pendidikan Indonesia (Indonesia University of Education) with research experience.

A questionnaire was used to collect data related to how students responded to SBL Apps and how they increase their critical thinking skills. The questionnaire was provided in the form of statements that students filled out with closed answer options, namely strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD). While the interviews were conducted to obtain complementary data and to clarify the responses that students provided in the questionnaire (Creswell, 2014). The observations were made by the team to ensure that students listened to and could understand well the explanation on how to use SBL Apps so that they can explore SBL Apps optimally.

2.4. Data Collection Process

The data collection was divided into four stages of activity.

2.4.1. Preliminary Stage

At this stage, the research team first asked permission to the school, namely SDN 1 Citimun, Sumedang Regency, West Java by submitting an application for a permit addressed to the Headmaster of the school to carry out the data collection process involving third grade students. After obtaining permission, the data collection process was carried out. The researcher came to classroom and did the research processes.

2.4.2. Pre-Treatment Stage

The students were given directions and explanations on how to use SBL Apps.

Figure 4. Explanation of Instructions to Use SBL Apps

We used a projector to provide directions and explanations on how to operate SBL Apps, namely by displaying the explanations in the SBL Apps manual book (Isrok'atun et al., 2021). The purpose of this activity is to ensure that there were no technical problems when the students operate SBL Apps.

2.4.3. Treatment Stage

After the students were observed having good understanding of how to use SBL Apps, they were asked to operate the app. They were observed to ensure it ran optimally and all students had explored the SBL Apps with all the digital activities in it.

2.4.4. Post-Treatment Stage

Students who had finished exploring the SBL Apps were asked to fill out the questionnaire. Their answer were followed up through interview.

Figure 5. Students Filling-Out the Questionnaires

2.5. Data Analysis

Obtained data were analyzed qualitatively and quantitatively. The qualitative data processing was carried out on data from interviews with students, namely by reducing data, simplifying, grouping, concluding and verifying, and presenting data in an easy-to-understand narrative form (Creswell, 2014).

Meanwhile, the quantitative data was obtained through the questionnaire. The responses were then scored using a Likert scale and the average score was calculated. Furthermore, one-sample t-test was conducted to see the students' improvement of the critical thinking skills to be generalized. The quantitative data processing used Microsoft Excel and IBM SPSS Statistics 24 (Creswell, 2014).

3. Results

3.1. Students Operating SBL Apps

This research was conducted when the elementary school had begun the learning activities offline. Students came to school, carried out learning activities in classes with limited face-to-face learning hours. Therefore, students were prohibited from bringing gadgets to school. The gadgets used to operate SBL Apps were provided by the research team, which can be downloaded at https://play.google.com/store/apps/details?id=com.sblapps.smartapps.

Due to the limited gadgets availability, the 16 students took turns in operating the SBL Apps. Each student was given sufficient time to surf the SBL Apps with various activities in it. We had ensured that the activities of 1) observing, 2) selecting information, 3) selecting a question, and 4) clarifying the information in the discussion section, were done well. Students who had completed the task of operating SBL Apps then filled-out the questionnaire to provide their responses on the use of the SBL Apps.

Figure 6. Students Operating the SBL Apps

3.2. Student Responses on the Use of SBL Apps

Two aspects were explored in the questionnaire and the interview data were used as a support, namely 1) what the students think of SBL Apps, and 2) how the students are interested in SBL Apps. These two aspects were translated into several statements in the questionnaire. The results are as follows.

Table 1. Student Responses to SBL Apps

Aspect	Statement	Student Response			
		SA	S	TS	SA
Students' opinion of SBL Apps	I find this application easy to use.	13	2	1	
	I like this application to use in learning.	13	3		
	I feel happy after using this application.	15	1		
Interests in SBL Apps	I like the part of choosing information in this application.	8	8		
	I like part of choosing questions in this application.	13	3		
	I like part of discussion in this application.	12	4		
	The words used in SBL Apps are difficult to understand	3	3	8	2

Description:

SA : Strongly Agree

A : Agree

D : Disagree

SD : Strongly Disagree

The student responses in Table 1 above are explained as follows.

3.2.1. Students Opinion of SBL Apps

As many as 15 students (94%) agreed and strongly agreed that SBL Apps was an easy-to-use mobile application. There was only a student expressed disagreement. SBL Apps was an Android-based game

that was operated using a gadget. This opinion was also reinforced by the results of the questionnaire which states that 100% of students stated that they felt happy and even very happy after using SBL Apps.

All students (100%) agreed that SBL Apps should be used in learning, especially for third graders materials. In other words, what students probably wanted was the concept of learning while playing. This means that in operating SBL Apps, the impression they felt was the sensation of playing, even though there were a lot of third grader learning materials that they could get.

The questionnaire data were reinforced by the interviews. The following are excerpts of the interviews (R=researcher, and S=student).

R : *Bagaimana perasaanmu setelah mencoba aplikasi SBL Apps?*

(How do you feel after trying the SBL Apps?)

S : *Senang. Bisa belajar dengan aplikasi yang menyajikan materi pembelajaran di sekolah. Bisa dipelajari dimanapun karena SBL Apps bisa di-install di gadget masing-masing.*

(Happy. I can learn with an application that present learning materials at school. (It) can be studied anywhere because of SBL Apps can be installed on any gadget.)

The student felt happy because while playing, they could also learn about the material taught at school as the content of the material in SBL Apps. In addition of being fun, the activities were also easy for them could be done anywhere. Even if it had not been installed, it is not a problem for them. Elementary school students today are already adept at downloading various applications from the Google Play Store.

R : *Apakah kamu menyukai penggunaan SBL Apps jika digunakan untuk pembelajaran?*

(Do you like using SBL Apps if you use it for learning?)

S : *Suka, karena aplikasinya mudah digunakan. Kemudian dilengkapi dengan gambar pada pembahasan materinya. Materi yang ada dalam aplikasinya pun menggunakan bahasa yang mudah dipahami. Serta gambar-gambar yang ada dalam SBL Apps sering ditemui dalam kehidupan sehari-hari.*

((I) like it, because the application is easy to use. Then, it is equipped with pictures in the discussion of the material. The material in the application also uses language that is easy to understand. And the pictures in SBL Apps are often found in everyday life.)

Since students liked the SBL Apps application both in terms of features and content, certainly the SBL Apps will not burden them if it were also used in the learning process. Even though it seems like a game, SBL Apps also indirectly train students in improving critical thinking skills.

3.2.2. Student Interest in SBL Apps

There were several activities in SBL Apps that students liked, namely the information selection activity, in which 50% students strongly agreed and 50% students agreed. This activity was indeed interesting, because without realizing it, students had previously been invited to observe the existing picture or situation. To like the Selecting Questions section and the Discussion section is to like a package. After the students chose which questions support the information they previously chose from the situations they have previously observed, they would certainly want to know what is discussed in this material. This is because the contents in the Discussion section of SBL Apps were also material content that they learn in class.

This statement was reinforced by the following interview.

R : *Bagian manakah yang paling kamu sukai dalam SBL Apps?*

(Which part do you like the most in the SBL Apps?)

S : *Bagian memilih pertanyaan dan memilih informasi yang tepat. Karena harus teliti mengamati gambar yang ada. Selain itu, di bagian tersebut juga ada keterangan benar dan salah yang dilengkapi emoticon dan suara benar/salah dengan ekspresi berbeda.*

((I like) the part of choosing questions and choosing the right information, because I had to look carefully at the pictures. In addition, in that section there was also a true and false statements that were equipped with emoticons and true/false sounds with different expressions.)

Meanwhile, there were students (37%) who thought that the words used in SBL Apps were difficult to understand. The reason could be that they were not familiar with the activities of looking up information and compiling questions. Such activities are still rarely trained by teachers in the classroom. Generally, in class, students are trained more in answering questions than they are trained in formulating questions.

In addition to qualitative analysis, the results of this questionnaire were also analyzed quantitatively. The questionnaire responses from the 16 students were tested for significance using the one-sample t test. The one-sample t test was conducted to see whether the responses obtained from the 16 samples were significantly generalizable to the population in this research or whether the data were not sufficient. The test results are as follows.

Table 2. One-Sample t Test Results

n	Response Score		One-sample test (test value = 3)				95% confidence interval of the difference		Information
	Mean	Std. Deviation	t	df	Sig.(2-tailed)	Mean difference	lower	upper	
16	3.588	.3442	6.827	15	.000	.5878	.404	.771	Students' responses were

	significantly positive

Table 2 shows that the mean questionnaire score related to student responses to the use of SBL Apps was 3.588 with a standard deviation of .3442. This mean was then tested using a one-sample t test at test value=3. The value of Sig.(2-tailed) = .000 was obtained, which means that the value of 3.588 was significantly different from a score of 3, as the limit of the negative response category (if the score is less than 3). From the results of this one-sample t test, it can be concluded that the students' responses to the use of SBL Apps was positive, significantly at the 95% confidence level.

3.3. SBL Apps Train and Improve Students' Critical Thinking Skills

SBL Apps has several levels of play that can be done, ranging from easy, medium, to difficult levels. With each level having activities: 1) observing; 2) selecting information; 3) selecting a question; and 4) clarifying the information in the discussion section.

3.3.1. Observing Activity

Look at the following picture!

Figure 7. Situation

Figure 7 illustrates that in the Easy Level (*mudah*) there are two situations to choose. The situation in SBL Apps here is in the form of pictures, from which various information and questions related to the third grade material can be extracted. Situation 1 shows a picture of a cat and some chicks, while Situation 2 shows a picture of a farmer who is in his garden. These two situations are what students will observe later. If one of these situations is selected, a new command will appear for the next SBL Apps activity.

3.3.2. Information Selection Activity

See Figure 8 below!

Figure 8 . Selecting Information

Under the cat and chick picture, the command instructs the player to choose the correct information from the picture above. At the bottom, there are six options containing information that fits the picture. Before choosing which information is the right one, the students had to observe the pictures of the cats and the chicks. They then matched and chose the correct information. If the selection is correct, a smiling face emoticon will appear, and if it is wrong, a sad emoticon will appear, accompanied by a voice feature as an indication of the accuracy of the selected answer.

3.3.3. Selecting Questions Activity

After passing through the activity of selecting information, the next activity was selecting the correct question based on the situation/image presented as illustrated in Figure 9 below.

Figure 9 . Selecting a Question

This activity was still based on the same situation/picture in the Selecting Information activity. Here, the students were trained to ask questions by choosing from six available options. In addition, the students were also faced with a choice of questions that are: 1) questions that do not even need to be asked; 2) unanswered questions; 3) questions that do not need to be answered; and 4) questions that are related to the existing situation/image. Although indirectly, this activity also trained students in compiling appropriate interrogative sentences, based on the context of the situation/picture and in general can improve problem posing abilities.

3.3.4. Discussion Activity

Figure 10 shows the display in the Discussion Activity.

Figure 10 . Discussion Clarification

In the discussion section, students could confirm and clarify by doing reflective and metacognitive activities. Students' reflective activities were carried out by recalling the context of the situation/image presented in the previous activity. They would obtain clarification from the explanations in this section so that it was easier for students to understand the context of the material in the SBL Apps.

In addition to the explanation activity in the SBL Apps which could train critical thinking skills, data on how to improve students' critical thinking skills were also analyzed from the results of the students' responses. Questionnaires were given to determine student responses to the 4 activities in SBL Apps. The questionnaire data was divided into two aspects, namely 1) critical thinking skills, and 2) problem posing abilities using SBL Apps, which were spread over 7 statement items. The results are as follows.

Table 3. Student Responses regarding Critical Thinking Ability

Aspect	Question	Student response			
		SA	S	TS	STS
Critical thinking skills	I feel that the presentation of the discussion in SBL Apps makes it easier to understand the material	13	3		
	The SBL Apps helps me to be more skillful in understanding	14	2		
	By using SBL Apps, I find it easier to give explanations	13	3		
	I feel that using SBL Apps can make it easier to draw conclusions	14	2		
Problem posing skills	I feel using SBL Apps helps to be able to ask the right questions based on the situation	14	1	1	
	I feel that using SBL Apps helps to ask the right questions based on the information that can be extracted	9	6	1	

	I feel that using SBL Apps helps me to be able to compose good question sentences	15	1

Description:
SA : Strongly Agree
A : Agree
D : Disagree
SD : Strongly Disagree

All students (100%) said that the SBL Apps was accommodating them to understand the material and made them more skilled in how to understand a subject matter. The activities were getting information, carrying out reflective and metacognitive activities, compiling questions that made them curious, and also matching and clarifying in the Discussion section. These activities made the students make conclusions about the context of the material being studied.

The questionnaire results were supported by the interview.

R : *Apakah dengan penggunaan SBL Apps kamu bisa menjelaskan pengertian mengenai suatu pembahasan dengan mudah?*

(Can you explain something in a discussion easily with the use of SBL Apps?)

S : *Ya, karena pembahasannya cukup lengkap serta disertai gambar yang bisa mempermudah untuk memahaminya. Selain itu, di bagian pembahasan, beberapa materi terpisah, seperti pada level mudah ada pembahasan penjumlahan dan kalimat pujian. Jadi bisa dipahami dengan baik.*

(Yes, because the discussion is quite complete and accompanied by a picture so it is easier to understand. Also, in the discussion section, the materials are divided, for example, there was a discussion on addition materials in the easy level and praising expressions materials. So, it can be understood easier.)

R : *Apakah dengan penggunaan SBL Apps dapat memudahkan untuk memberikan alasan/jawaban lain yang sesuai dengan pertanyaan?*

(Do you find it easier to give an appropriate reason/answer to the question with the use of SBL?)

S : *Ya, karena terbantu oleh situasi yang ada, yang sebelumnya telah diamati.*

(Yes, because the situation helps, (which was) previously observed.)

R : *Apakah dengan penyajian pembahasan dalam SBL Apps membuat kamu memahami materi dengan mudah?*

(Does the discussion presentation in SBL Apps help you understand the material easier?)

S : *Ya, karena pada tampilannya sudah ada, tinggal memilih pernyataan yang benar atau salah. Hal ini seolah menjadi petunjuk akan materi yang ada di pembahasan, nantinya.*

(Yes, because the display is there, (I) only need to choose the correct or incorrect statements. This is like a clue on the materials in the discussion later.)

For data on students' problem posing abilities, the results of the questionnaire listed in Table 3 shows that with SBL Apps, students were helped in practicing their abilities to ask the right questions based on the existing situation/picture. Besides that, students were also helped in asking the right questions based on information that can be extracted from a context and situation/picture. It also trained students in compiling good interrogative sentences, even there was 1 person out of 16 students who expressed disagreement.

Student statements in the questionnaire were also supported by data obtained from interviews.

R : *Apakah dengan penggunaan SBL Apps membantu kamu untuk bisa mengajukan pertanyaan?*

(Is SBL Apps helping you to be able to ask questions?)

S : *Ya, karena situasinya mudah dipahami serta sering ditemui. Selain itu kalimat pertanyaannya disusun terurut.*

(Yes, because the situation is easy to understand and often encountered. In addition, the question sentences are arranged in order.)

The four stages of activities in SBL Apps were an effort to improve students' critical thinking skills. The indicators are: 1) formulating problems; 2) collecting data and compiling the necessary information; 3) analyzing data and information to construct arguments; 4) asking and answering questions; 5) assessing the credibility of the information; 6) observing; 7) evaluating; and 8) drawing conclusion.

To support this conclusion, the questionnaire responses on to how to improve students' critical thinking skills were also tested for significance by using a one-sample t test. The one-sample t test was conducted to see whether the responses related to increasing students' critical thinking skills could be significantly generalized to the population in this research or whether the data were not sufficient. The test results are as follows.

Table 4. One-Sample T Test Results

n	Response Score		One-sample test (test value = 3)				95% confidence interval of the difference		Information
	Mean	Std. Deviation	t	df	Sig.(2-tailed)	Mean difference	lower	upper	
16	3.813	.2579	12.603	15	.000	.8125	.675	.950	SBL Apps could improve students' critical thinking skills significantly

Table 4 shows that the average score of the responses about improving students' critical thinking skills was 3.813 with a standard deviation of .2579. This figure was tested using a one-sample t test at test value=3. The value of Sig.(2-tailed) = .000 was obtained, which means that the value of 3.813 was significantly different from a score of 3, as a response category limit that did not increase critical thinking skills (if the score is less than 3). Therefore, it can be concluded that SBL Apps can improve students' critical thinking skills, significantly at the 95% confidence level.

4. Discussion

The Android gadgets and applications were not new for the students (Fuentes & Sörum, 2019). Even lower grade students were used to them and proficient in operating them. Therefore, even though the SBL Apps was an educational game, it was well-received by children because it was packaged like playing games. This was also supported by the fact that they were still children in their playing age (Onnela et al., 2021; Barron et al., 2021). This means that in operating SBL Apps, the impression they felt was the sensation of playing, even though there were a lot of third grader learning materials that they could get.

This activity was indeed interesting, because without realizing it, students had previously been invited to observe the existing picture or situation. When someone is asked to observe something, their level of focus will increase, because they are required to be observant and careful in looking (van Peppen et al., 2022; Aloisi & Callaghan, 2018; Hjerm et al., 2018; Bearman et al., 2016). This will result in an increase in one's involvement in the investigation. As a result, it can give rise to a pleasant sensation.

Through the activity of selecting information, students were trained to be skilled in observing pictures. This trained the students in the investigation process, namely investigating what information can be obtained from the picture (van Peppen et al., 2022; Aloisi & Callaghan, 2018; Hjerm et al., 2018; Bearman et al., 2016). When students wanted to choose which information is correct, they would look back and forth and match between the pictures and the available choices, and this could be done repeatedly until they were sure of their choice. This repetition process is a practice of their reflective thinking skills. The ability to think reflectively is an ability to connect the knowledge obtained with previous knowledge, so that a conclusion is obtained to solve new problems (Wijnen et al., 2021; Van Velzen, 2017). The reflection activity was done by paying attention to the picture again and then reading and or choosing appropriate information. If they were not sure, students would repeat it (Wijnen et al., 2021; Van Velzen, 2017). This reflection activity can train and improve students' foresight and prudence, so that students could choose information based on the existing situation correctly.

In the discussion section, students could confirm and clarify by doing reflective and metacognitive activities. Students' reflective activities were carried out by recalling the context of the situation/image presented in the previous activity. They would obtain clarification from the explanations in this section so that it was easier for students to understand the context of the material in the SBL Apps. To understand the context of the material, the students were actually practicing their metacognitive abilities. Metacognitive ability is students' ability to control their own understanding, namely by carrying out remembering activities, reviewing, and evaluating previous activities (observing, selecting information, and selecting questions) with the explanations in this discussion section (Moritz et al., 2022).

The four stages of activities in SBL Apps were an effort to improve students' critical thinking skills. The indicators are: 1) formulating problems; 2) collecting data and compiling the necessary information; 3) analyzing data and information to construct arguments; 4) asking and answering questions; 5) assessing the credibility of the information; 6) observing; 7) evaluating; and 8) drawing conclusion (van Peppen et al., 2022; Aloisi & Callaghan, 2018; Hjerm et al., 2018; Bearman et al., 2016). It is expected that with low-grade students having this ability, they will be more observant and careful

when receiving information in the rapid flow of information from various digital platforms. This is because they have been trained in filtering various kinds of information as they do when operating SBL Apps.

5. Conclusion

There were several levels of play that can be done in SBL Apps, ranging from easy, medium, to difficult levels, in which each level has the same activity type. The "selecting information" activity trained the students to observe, investigate, look back (do repetition), carry out reflection activities, and increase the power of foresight and awareness. The "choosing questions" activity trained the students to ask questions, compose appropriate interrogative sentences, and to improve problem posing abilities. While in the discussion section, students did confirmation and clarification activities by carrying out reflective and metacognitive activities. These activities improved students' critical thinking skills as seen in the following the indicators, 1) formulating problems; 2) collecting data and compile the necessary information; 3) analyzing data and information to construct arguments; 4) asking and answering questions; 5) assessing the credibility of the information; 6) observing; 7) evaluating; and 8) drawing conclusion.

6. Recommendations

SBL Apps can be used as an alternative activity in the learning process, especially for lower grade elementary school students, due to its materials designed for lower grade elementary school students. Students will not feel that they are learning, but are playing as they enjoy the application contain materials related to subject matter at school. Thus, the it trains students to improve their critical thinking skills.

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References

Acaroglu, E., Assous, M., Bransford, R., Dal Oglio Da Rocha, L. G., Falavigna, A., France, J., ... & Şenköylü, A. (2022). Evaluation of Blended Online Learning in Three Spinal Surgery Educational Courses. *Journal of European CME*, *11*(1), 2014042. https://doi.org/10.1080/21614083.2021.2014042

Aloisi, C., & Callaghan, A. (2018). Threats to the validity of the Collegiate Learning Assessment (CLA+) as a measure of critical thinking skills and implications for Learning Gain. *Higher Education Pedagogies*, *3*(1),

57-82. https://www.tandfonline.com/doi/full/10.1080/23752696.2018.1449128%40rhep20.2018.3.issue-V1

Barron, C., Emmett, M. J., Patte, M. M., Higham, S., & Bulgarelli, D. (2021). Indoor play during a global pandemic: commonalities and diversities during a unique snapshot in time. *International Journal of Play*, *10*(4), 365-386. https://doi.org/10.1080/21594937.2021.2005396

Bearman, N., Jones, N., André, I., Cachinho, H. A., & DeMers, M. (2016). The future role of GIS education in creating critical spatial thinkers. *Journal of Geography in Higher education*, *40*(3), 394-408. https://doi.org/10.1080/03098265.2016.1144729

Booton, S. A., Hodgkiss, A., & Murphy, V. A. (2021). The impact of mobile application features on children's language and literacy learning: a systematic review. *Computer Assisted Language Learning*, 1-30. https://doi.org/10.1080/09588221.2021.1930057

Collins, B., Hoang, D. T., Nguyen, N. T., & Hwang, D. (2021). Trends in combating fake news on social media–a survey. *Journal of Information and Telecommunication*, *5*(2), 247-266. https://doi.org/10.1080/24751839.2020.1847379

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods approach (4th ed.)*. SAGE Publications, Inc. http://155.0.32.9:8080/jspui/bitstream/123456789/1091/1/Qualitative%2C%20Quantitative%2C%20and%20Mixed%20Methods%20Approaches%20%28%20PDFDrive%20%29-1.pdf

Fadilah, N., & Yohandi, Y. (2021). Analisis Framing Pengajian Muslimat pada Program Acara Kiswah Female TV9. *maddah*, *3*(1), 11-24. https://journal.ibrahimy.ac.id/index.php/maddah/article/view/1127/876

Fuentes, C., & Sörum, N. (2019). Agencing ethical consumers: smartphone apps and the socio-material reconfiguration of everyday life. *Consumption Markets & Culture*, *22*(2), 131-156. https://doi.org/10.1080/10253866.2018.1456428

Greve, S., Thumel, M., Jastrow, F., Krieger, C., Schwedler, A., & Süßenbach, J. (2022). The use of digital media in primary school PE–student perspectives on product-oriented ways of lesson staging. *Physical Education and Sport Pedagogy*, *27*(1), 43-58. https://doi.org/10.1080/17408989.2020.1849597

Haand, R., & Shuwang, Z. (2020). The relationship between social media addiction and depression: A quantitative study among university students in Khost, Afghanistan. *International Journal of Adolescence and Youth*, *25*(1), 780-786. https://doi.org/10.1080/02673843.2020.1741407

Hjerm, M., Johansson Sevä, I., & Werner, L. (2018). How critical thinking, multicultural education and teacher qualification affect anti-immigrant attitudes. *International Studies in Sociology of Education*, *27*(1), 42-59. https://doi.org/10.1080/09620214.2018.1425895

Iskrenovic-Momcilovic, O. (2020). Contribution of using mobile application on botanical fieldwork in primary school. *Interactive Learning Environments*, 1-13. https://doi.org/10.1080/10494820.2020.1826531

Isrokatun, I., Syahid, A. A., Putri, H. E., Julia, J., & Sunaengsih, C. (2019, October). Problem posing skill of elementary school students. In *Journal of Physics: Conference Series* (Vol. 1318, No. 1, p. 012124). IOP Publishing. https://iopscience.iop.org/article/10.1088/1742-6596/1318/1/012124/pdf

Isrokatun, I., Haryani, C. S., & Rahmi, N. I. (2021, April). Analysis of mathematical problem-posing ability. In *Journal of Physics: Conference Series* (Vol. 1869, No. 1, p. 012122). IOP Publishing. https://iopscience.iop.org/article/10.1088/1742-6596/1869/1/012122/pdf

Isrok'atun, Rosmiati, R., Khoerunnisah, R., & Rohman, Y.A. (2021). *Manual Book: Petunjuk Penggunaan Aplikasi SBL Apps [Manual Book: Instructions for Use of the SBL App]*. Unpublished. https://drive.google.com/file/d/1fl4azWJRg3d6fBe4gwoBezzV8NaMqrTw/view?usp=sharing

Kayis, A. R., Satici, B., Deniz, M. E., Satici, S. A., & Griffiths, M. D. (2021). Fear of COVID-19, loneliness, smartphone addiction, and mental wellbeing among the Turkish general population: a serial mediation model. *Behaviour & Information Technology*, 1-13. https://doi.org/10.1080/0144929X.2021.1933181

Lau, E. Y. H., Li, J. B., & Lee, K. (2021). Online learning and parent satisfaction during COVID-19: Child competence in independent learning as a moderator. *Early Education and Development*, *32*(6), 830-842. https://doi.org/10.1080/10409289.2021.1950451

Lu, J., Meng, S., & Tam, V. (2014). Learning Chinese characters via mobile technology in a primary school classroom. *Educational Media International*, *51*(3), 166-184. https://doi.org/10.1080/09523987.2014.968448

Makinuddin, M., Anam, S., & Shoffiyah, S. (2020). CHARACTER BUILDING DAN PENDIDIKAN ISLAM DI ERA NEW NORMAL. *MIYAH: Jurnal Studi Islam*, *16*(1), 185-199. http://ejournal.inkafa.ac.id/index.php/miyah/article/view/247/193

Mannion, K. H., & Nolan, S. A. (2020). The effect of smartphones on anxiety: An attachment issue or fear of missing out?. *Cogent Psychology*, *7*(1), 1869378. https://doi.org/10.1080/23311908.2020.1869378

McCutcheon, K., Lohan, M., & Traynor, M. (2016). A systematic review protocol on the use of online learning versus blended learning for teaching clinical skills to undergraduate health professional students. *Higher Education Pedagogies*, *1*(1), 82-88. https://doi.org/10.1080/23752696.2015.1134204

Mendes de Oliveira, M., Sporn, Z., Kliemann, L., Borschke, A., & Meyering, M. (2021). Online language learning and workplace communication: a study on Babbel's virtual-classroom solution. *Computer Assisted Language Learning*, 1-26. https://doi.org/10.1080/09588221.2021.2002364

Moritz, S., Klein, J. P., Lysaker, P. H., & Mehl, S. (2022). Metacognitive and cognitive-behavioral interventions for psychosis: new developments. *Dialogues in clinical neuroscience*. https://doi.org/10.31887/DCNS.2019.21.3/smoritz

Onnela, A., Hurtig, T., & Ebeling, H. (2021). School professionals committed to student well-being. *International journal of circumpolar health*, *80*(1), 1873589. https://doi.org/10.1080/22423982.2021.1873589

Prescott, J. E., Bundschuh, K., Kazakoff, E. R., & Macaruso, P. (2018). Elementary school–wide implementation of a blended learning program for reading intervention. *The Journal of Educational Research*, *111*(4), 497-506. https://doi.org/10.1080/00220671.2017.1302914

Rahmat, R. (2021). Pembelajaran Aswaja Bagi Kaum Rebahan Berbasis Multidisipliner. *An Nahdhoh Jurnal Kajian Islam Aswaja*, *1*(1), 74-88. http://riset.unisma.ac.id/index.php/nahdloh/article/view/10742/8439

Republika. (2021). *Mengenalkan Teknologi pada Anak Usia Dini [Introducing Technology to Early Childhood]*. Republika, edisi 6 Februari 2021. https://www.republika.co.id/berita/qo413u483/mengenalkan-teknologi-pada-anak-usia-dini

Ribeiro Bezerra, J. F. (2021). Content-based fake news classification through modified voting ensemble. *Journal of Information and Telecommunication*, *5*(4), 499-513. https://doi.org/10.1080/24751839.2021.1963912

Riry. (2021). *Situation-Based Learning Apps (SBL Apps)*. Google Play Store. https://play.google.com/store/apps/details?id=com.sblapps.smartapps

Sørenssen, I. K., & Bergschöld, J. M. (2021). Domesticated Smartphones in Early Childhood Education and Care settings. Blurring the lines between pedagogical and administrative use. *International Journal of Early Years Education*, 1-14. https://doi.org/10.1080/09669760.2021.1893157

Undheim, M. (2021). Children and teachers engaging together with digital technology in early childhood education and care institutions: a literature review. *European Early Childhood Education Research Journal*, 1-18. https://doi.org/10.1080/1350293X.2021.1971730

van Peppen, L. M., van Gog, T., Verkoeijen, P. P., & Alexander, P. A. (2022). Identifying obstacles to transfer of critical thinking skills. *Journal of Cognitive Psychology*, *34*(2), 261-288. https://doi.org/10.1080/20445911.2021.1990302

Van Velzen, J. H. (2017). Measuring senior high school students' self-induced self-reflective thinking. *The Journal of Educational Research*, *110*(5), 494-502. https://doi.org/10.1080/00220671.2015.1129596

Voshaar, J., Knipp, M., Loy, T., Zimmermann, J., & Johannsen, F. (2022). The impact of using a mobile app on learning success in accounting education. *Accounting Education*, 1-26. https://doi.org/10.1080/09639284.2022.2041057

Wijnen, F., Walma van der Molen, J., & Voogt, J. (2021). Primary school teachers' attitudes toward technology use and stimulating higher-order thinking in students: a review of the literature. *Journal of research on technology in education*, 1-23. https://doi.org/10.1080/15391523.2021.1991864

Wilson, S. (2016). Digital technologies, children and young people's relationships and self-care. *Children's Geographies*, *14*(3), 282-294. https://doi.org/10.1080/14733285.2015.1040726

Zarifsanaiey, N., Mehrabi, Z., Kashefian-Naeeini, S., & Mustapha, R. (2022). The effects of digital storytelling with group discussion on social and emotional intelligence among female elementary school students. *Cogent Psychology*, *9*(1), 2004872. https://doi.org/10.1080/23311908.2021.2004872