

SiskomEd as an Android Based Learning Media Solution to Support 21st Century Learning

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Abstract

During teaching and learning activities, it was observed that students' learning outcomes often fell below the minimum standard grades. A preliminary observation revealed that the primary causes of low grades were students' low motivation and inadequate supportive learning facilities. The research continued through several steps, including a) identifying the problem, b) analyzing and formulating the problem, c) planning the Classroom Action Research (CAR), and d) implementing the CAR. The identified issues were then analyzed, and a plan was made to carry out the CAR. In the Classroom Action Research activities, students were treated by providing them with Android-based learning media in the Computer Systems subject, named SiskomEd. Infrastructure issues such as internet connectivity problems were overcome by using SiskomEd offline. Additionally, utilizing Android-based learning media is one way to support 21st-century learning by leveraging technology. The research results showed that students experienced an improvement in grades after using the SiskomEd learning media in teaching and learning activities. The increase in grades was driven by the enhanced interest in learning among students. Students did not feel pressured during the learning process because the media used was engaging, colorful, and visually appealing. 21st-century learning media made students feel like they were playing while learning, leading to their enthusiasm to study the materials within it.

Keywords: 21st-century learning, android-based learning media, SiskomEd, student interest in learning

Background

In educational activities, teachers play a crucial role as key facilitators of the learning process. However, many teachers rely solely on textual reading materials, which are insufficient for ensuring student comprehension. This often leads to student boredom, reluctance to complete assignments, and ultimately, low grades. Traditional assessment methods, including daily quizzes, semester exams, and final exams, typically involve paper-based tests and manual grading, which are time-consuming and inefficient. These processes can be streamlined to facilitate quicker and more efficient assessment.

In this digital era, the use of media is very necessary, especially in learning, because students can acquire knowledge quickly and simply without limitations of space and time. The learning process requires the creativity and innovation of teachers in managing learning media so that they can be used online and offline. According to (Audie, 2019), the use of learning media can increase students' motivation to learn. Media can stimulate students' brains to learn, and students tend not to get bored when using media in learning. Looking at a brief observation of students at school where 99% of them have Android-based smartphones, innovation can be made in using Android-based learning media. However, even though almost all students have smartphones, many of them do not have internet quota.

This limitation becomes one of the problems that must be solved by creating Android- based learning media that can be used offline or without continuous internet usage. In daily life practice, the author can witness many positive things as a result of using smartphones.

Education media plays a crucial role in learning. Innovation in media development is highly needed as learning media is closely related to evolving technology. Learning media must keep up with current technology, adopt it, and integrate it into learning activities. Currently, Android technology is very popular among the community, especially teenagers. Therefore, there is a need for the development of learning media that can be utilized with Android technology in schools.

Research conducted by (Wahid, 2018) found that educational and learning media can be beneficial as a tool for delivering standardized teaching materials, making the learning process clearer and more interesting, making the learning process more interactive, efficient in time and energy, improving the quality of student learning outcomes, enabling the learning process to be carried out anywhere and anytime, fostering a positive attitude of students towards the material and the learning process, and transforming the role of teachers towards a more positive and productive direction.

According to Arsyad (2007) on Yuliawati Yunus,dkk 2018, learning media is any teaching tool used to help deliver lesson material in the teaching and learning process, thus facilitating the achievement of formulated learning objectives. Good learning media is media that can compete with technological advancements. Therefore, there is a need for Computer-Based Android Learning Media Systems that are expected to assist the learning process. Within the Computer-Based Android Learning Media Systems, there are materials such as theory, images, and forms that can be displayed, computer system learning videos, and most importantly, competency tests in the form of exercises that allow students to see how far their abilities go. This can focus students' attention on learning and prevent boredom in the learning process, as it is considered more engaging and varied (Rahayu et al., 2022).

Learning in the context of 21st-century education, especially in the 2013 curriculum, involves students learning material through examples, applications, and real-world experiences both inside and outside the school. To meet these demands as part of the implementation of the 2013 curriculum, it is necessary to involve the appropriate, sustainable, and affordable use of ICT. The needs of the 21st century, such as now, require deep knowledge skills (cognitive) in the context of life regarding a problem, event, or incident. Computer-based learning media, as a tool both physical and non-physical, is used as a mediator between teachers and students to understand lesson material more effectively and efficiently (Yusuf, I & Subaer, 2013). The integration of ICT in learning is a component of 21st-century learning. Science and technology are constantly evolving rapidly over time. This technology combines the world without boundaries, even if geographically separated (Murniayudi et al., 2018). Similarly, in the field of education, the increasing era of globalization marked by rapid developments in various sciences and technologies, especially in information and communication technology, has transformed the world. The world today has become more transparent without knowing national boundaries. This condition impacts all aspects of societal, national, and state life. Furthermore, it can also influence the mindset, attitudes, and actions of society as a whole.

With the advancement of science and technology (IPTEK), changes in the curriculum, media, and learning facilities will also follow. In this digital era, learning media that can adapt to 21st-century education is needed. The innovation and creativity of learning media are among the current issues in education. Therefore, there is a need for improvement in the provision of educational services to prepare for 21st-century learning. The development of education in the era of globalization poses a challenge for Indonesia to enhance the quality of its resources. Thus, educators' contribution in providing educational services becomes one of the pioneers of the nation's progress in the present and future.

(Dewinta et al., 2022) In addition to causing students to become bored in the classroom, another challenge of offline learning is the limited technical facilities in schools. One weakness of this model is the minimal or even complete lack of technology usage. This makes students unprepared to face the digital world, potentially leading to falling behind in technological advancements.

Furthermore, the lack of references or very limited use of learning resources also poses a challenge in offline learning. Often in face-to-face learning, the references used are only books that support teaching and the teacher's knowledge. As a result, students' knowledge is limited, and the learning process becomes monotonous.

Research Method

This research uses the Class Action Research (PTK) method. Non-class research is research conducted in class or at school to solve learning problems that are being experienced by students with the aim of improving student understanding so that learning outcomes increase. According to Muchlisin Riadi (2019), Classroom Action Research (CAR) is a form of research that occurs in the classroom in the form of certain actions taken to improve the teaching and learning process in order to improve learning outcomes that are better than before. Class action research (PTK) is carried out in two cycles, and each cycle consists of four stages of activities: planning, action, observation, and reflection.

According to IG AK, Wardani (2022), the characteristics of classroom action research (PTK) include:

- a. The existence of problems in PTK means that the exercises carried out by teachers in class are problems that must be resolved due to the awareness they bring.
- b. In PTK, teachers collect data from their own practice through self-reflection. This means that teachers try to remember what happened in the classroom and how these actions impacted students.
- c. Because PTK is carried out in a classroom context, the focus of the research is learning in the form of teacher and student behavior when interacting.
- d. PTK is designed to improve learning. Improvements will be carried out gradually and continuously while research activities are still being carried out. Therefore, it is known that in PTK there is an implementation cycle in the form of a pattern: planning-action-observation-reflection-revision (re-planning).

According to Kemmis and Taggart (1992) in Sukardiyono (2015), there are four activities, which will be explained as follows:

- a. Identifying problems: In this research, it was found that in teaching and learning activities using book learning media, there were several students who felt bored and less interested. This results in less-than-optimal learning outcomes.
- b. Analyzing and formulating problems: In the current digital era, it can influence students' daily habits and lifestyles, including teaching and learning activities. Students are more interested in using digital media than physical books.
- c. Planning PTK: In this case, the teacher plans to change student learning. If previously students studied using text books, then in this research, an experiment will be carried out using Android-based digital media.
- d. Carrying out PTK: At this stage, students are given treatment in the form of Android-based digital media. This was done to get comparison results between learning media using books and student learning outcomes using Android-based media.

Result and Discussion

This research is conducted in two cycles, and each cycle has stages as follows:

a. Cycle 1 Research:

1. Planning Stage
At this stage the teacher encourages students to learn and understand using books and learning media using text, then the teacher prepares measuring instruments to measure students' abilities via Google Form.
2. Planning and Implementation Stage of Activities
In cycle 1, 13 students were implemented. In this case, the researcher plays the role of teacher. The learning process refers to planning in the form of learning activity mechanisms. Then take action in the form of organizing learning. Implementation of learning activities is carried out using textbook learning media. During the teaching and learning process, research observations were also carried out. Before

carrying out the ability test, students are given directions to understand the lesson by reading books and online learning resources that use text. After students understand the material, they continue with the exam. The media used as a tool to measure student abilities is Google Forms. The questions provided are number system material, which consists of four sub-subjects, including decimal numbers, binary numbers, octal numbers, and hexadecimal numbers. The question models given are multiple-choice questions; fill in the questions, choose many, and match. Each type of question has a different score; the score is based on the level of difficulty given.

The results of the cycle 1 activities can be presented in the table below:

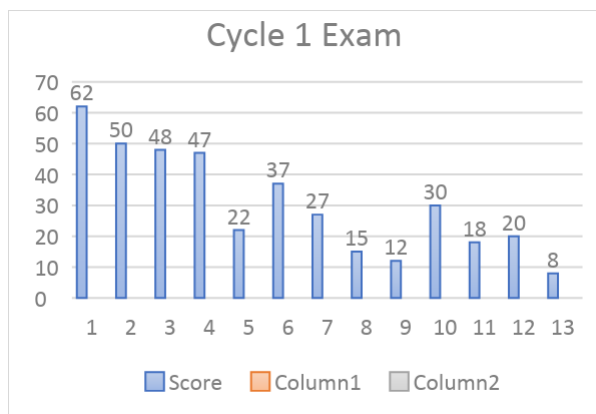


Image 1. Cycle 1 Exam Results

From the graph above, it can be seen that the exam results obtained by the students have the lowest score at 8, while the highest score is at 62. This indicates that the students' abilities are still below the Minimum Passing Grade (KKM) of 75.

b. Evaluation of Cycle 1

After conducting the research activities in Cycle 1, it was found that there were issues regarding students' understanding of a particular subject. When students understand the material using textbook media, they quickly become bored and this triggers laziness in learning. The media used is not engaging enough to capture students' interest in learning. Furthermore, during the exams, the media used is not efficient. Students face difficulties due to the lack of the required internet access. Online media, which was expected to help reduce the manual workload of teachers in grading exams, actually introduced new problems, such as some students facing internet connectivity issues. Inadequate internet access and weak signal strength were identified as problems encountered in Cycle 1 of the research. By identifying these issues, including: a) unengaging teaching methods and media, b) inadequate facilities and infrastructure, c) lack of support for teachers in performing their tasks. Based on these problems, one action will be taken as a solution in Cycle 2 of the research. The solution involves creating a learning media that can enhance students' interest in learning, facilitate their understanding of the material, assist students in terms of resources, and make it easier for teachers to grade exams. Adhering to the digital learning media Support 21st Century Learning, in Cycle 2 of the research, the media used will be android-based learning media that can be used by students without requiring internet access (offline).

c. Cycle 2 Research

Cycle 2 research is conducted after reflecting and evaluating the activities of Cycle 1 research. It involves treating students with a digital android-based learning media that can be used without internet connection (offline). The learning media is named SiskomEd. SiskomEd contains learning materials with defined learning objectives and competencies. The presented material is packaged in a way that captures students' interest in learning. The available material is designed with harmonious color combinations and font sizes.

Additionally, there are practice questions and exam questions provided in SiskomEd. The questions are divided into four models, similar to Cycle 1 treatment. However, the difference lies in the user-friendly presentation of the questions, making them more engaging to work on. The types of questions include multiple-choice, fill-in-the-blank, multiple select, and matching. Each of these question types carries different weightage based on the difficulty level. The total score given to students who answer all questions correctly is 100 points. Students who do not attempt or answer incorrectly will receive 0 points.

The exam results of the students can be presented in the table below:

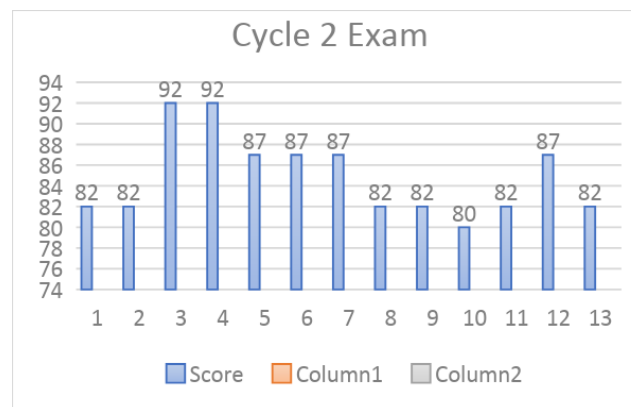


Image 2. Cycle 2 Exam Results

From the above graph, it can be observed that there is a significant improvement in students' grades after using the SiskomEd learning media. The lowest grade obtained by a student is 80, while the highest is 92. This indicates that the SiskomEd application provides an effective and efficient solution in the 21st-century learning process. Students find it easier to understand the material, resulting in higher grades above the Minimum Mastery Criteria (KKM).

d. Evaluation of Cycle 2

After conducting the second cycle of research activities, it was found that there was an improvement in students' learning outcomes. By using this media, it can reduce boredom and facilitate students in understanding the material. The media designed by the teacher is more efficient because it can be used with internet connection (online) and without internet connection (offline). This media can also lighten the teacher's burden in correcting students' exam results because the scores will automatically appear at the end after students complete their exams. This indicates that media created by teachers can support more efficient and effective learning in the 21st century learning process.

e. Comparison of Cycle 1 and Cycle 2 Research

In this research activity, data was collected to show the students' learning outcomes in Cycle 1 and Cycle 2. The Cycle 1 scores represent the grades obtained when students were taught using traditional methods such as textbooks and online reading materials. On the other hand, the Cycle 2 scores represent the grades obtained when students were treated using the android-based SiskomEd learning media.

The assessment data from both cycles can be seen in the graph below:

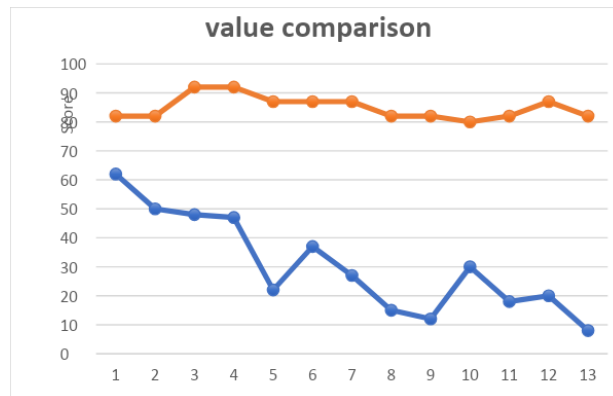


Image 3. Value Comparison

From the graph above, it can be observed that there is a significant difference between the scores of Cycle 1 and Cycle 2. In Cycle 1, students showed varied results, ranging from 8 to 62. Overall, the Cycle 1 results indicate that the students' abilities are below the minimum passing standard. The expected passing standard for the computer system subject is 75. Therefore, this issue needs to be addressed promptly to achieve optimal learning outcomes. On the other hand, the Cycle 2 results show that the students' abilities have reached the standard, with scores ranging from 80 to 92. Although no student has achieved the maximum score of 100 yet, the Cycle 2 results demonstrate an improvement in students' abilities to answer questions.

Conclusion and Suggestion

Conclusion

Based on the research conducted, it can be concluded that there are issues in the teaching and learning activities in the Computer System subject at Vocational School. The main problem identified is that students are not achieving the minimum required grades. This is primarily due to the mismatch in the learning media used in the teaching process, leading to a lack of motivation for students to learn. Additionally, the use of digital learning media that requires internet access poses a challenge due to unstable signals.

To address these issues, a solution in the form of 21st-century digital learning media was introduced. An android- based learning media named SiskomEd was developed to tackle the identified problems. This learning media presents study materials and exam questions in an engaging manner, attracting students' interest in learning. Furthermore, this media can be used offline, eliminating the need for internet access. The research has shown that students' learning outcomes improved significantly. The average score obtained by students in Cycle 1 was 30.46, while in Cycle 2 (using SiskomEd media), the average score increased to 84.92. The overall student scores meet the Minimum Mastery Criteria (KKM) of ≥ 75 . The average increase in students' scores from Cycle 1 to Cycle 2 is 54.86, indicating a 64.6% improvement in student grades

Suggestion

The suggestion from this research is that teachers need to enhance innovation in providing learning media to increase students' interest in learning. Additionally, the learning media created should meet the needs of 21st-century learning to keep pace with the times. The SiskomEd application, developed to enhance motivation and interest in learning, has been proven to help students achieve improved academic performance. It is hoped that this application will continue to be utilized in teaching and learning activities at Vocational School as a form of the school's contribution to preparing the younger generation for digital advancement and the 4.0 industrial revolution. It is expected that the SiskomEd application can serve as an inspiration for teachers to enhance the quality of learning media to be more effective and efficient.

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