

Research Article

Activities of Students During Learning Process in Mobile Learning Based on Android Package Kit

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ORCIDWahyuni Handayani: <https://orcid.org/0000-0001-5237-8951>Adam Malik: <https://orcid.org/0000-0003-4121-3259>**Abstract.**

The current outbreak of COVID-19 has affected lives including closure of educational institutions. Based on Android Package Kit (APK), developed by authors, a learning multimedia-interactive can be accessed as a whole learning activity by the students, including the worksheet. The instrument used to collect data in this study is a worksheet that is integrated in the APK. This worksheet is used to monitor students involvement and comprehension during mobile learning process. Students' engagement of learning process on sound waves topic is measured manually based on the analysis of their written answers against the worksheet. In this study, 12 boys and 23 girls student of class XI answered the questions in worksheet to exceed passing score in sound waves concept during learning process. Based on the results of the study, it can be concluded that learning by using worksheets integrated into an APK can attract students' interest to access it and increase student involvement in the learning process.

Keywords: activities of students, learning process, mobile learning, android package Kit

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1. INTRODUCTION

Recent research shows that involving students actively in learning activities results in better conceptual understanding compared to students listening to lectures passively [1]. Students who are actively engaged with what they are learning tend to understand more, learn more, remember more, enjoy it more and are more able to appreciate the relevance of what they have learned, than students who passively accept what we teach them [2]. Teachers who use strategies to increase student engagement in the classroom will find that students not only learn more, but the overall school experience is better for both students and teacher [3]. Students who are actively involved in lessons and activities result in much deeper understanding and much more enjoyment during the

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process [4]. Therefore, teachers are faced with a big challenge, how to encourage and enable our students to be involved in the learning process.

However, the current outbreak of the coronavirus disease (COVID-19) has affected lives, including the closure of educational institutions. With the advancement of technology both hardware and software, mobile technology which is increasingly widespread and ubiquitous has been recognized by many researchers and educators from a school perspective [5]. Android-based smartphones have good potential if they are used as interactive learning media for high school students. The use of smartphones for physics learning activities makes it easier for students to do learning [6]. Students can build their understanding through continuous and independent simulation and evaluation activities. The use of smartphones according to the explanation presented in this case is a solution to limitations in the learning process.

Smartphones with certain applications can be used as a means of mobile-learning (m-learning). M-learning is different from classroom learning. This condition creates substantial problems in monitoring during the learning process, among others, due to the absence of observers, learning that spreads across locations and times, learning activities may be interspersed with other activities, and there may be ethical problems associated with monitoring activities outside the classroom. Without face-to-face interaction activities, it is difficult for teachers to control, monitor and ensure whether students are active in the lesson, involved in the learning process and whether students have a much deeper understanding [7]. Lack of adequate teacher's monitoring of instructional can reduce the benefits of learning. To optimize the role of teachers as facilitators, teachers must be able to use appropriate learning media in the teaching and learning process. In this scenario, digital instruction and resources can be a viable alternative that poses a challenge for teachers to encourage students to be actively involved in the learning process.

To overcome the problem of monitoring m-learning, we have developed a physics teaching material on sound waves using one of the Android Package Kits (APK), namely App Inventor. This is different from previous research related to m-learning where the features available in the media consist of images, videos and quizzes [8] and text, images, video, audio and simulation [9], in the teaching materials that we have developed (Figure. 1), we fully integrate electronic books, student worksheets, virtual practicums, animated videos, games, quizzes, video tutorials and contact teacher menus that are directly connected to WhatsApp to facilitate student discussions with teachers. All menus can be accessed by students during the learning process according to the specified learning trajectory. In the learning materials that we have developed, there are:

1) home menu facilities, 2) learner schedules, and 3) contact teachers. The home menu contains: 1) electronic books, 2) virtual practicums, 3) animated videos, 4) discussions, 5) games, 6) quizzes, 7) video tutorials, and 8) groups discussion. In electronic books, learning videos, and quizzes, three learning meetings were made. Games according to the sound wave material there are games about the piano. The learning schedule menu has a calendar. Menu contact the teacher is connected to WhatsApp. Animated video facilities, quizzes and games train students for critical thinking skills. The worksheet is available in the discussion menu.

To find out whether the APK-based m-learning that we developed is working in its function to monitor students in terms of involvement and understanding of sound wave material during the learning process, in this study we analyzed students' answers to the questions contained in the integrated worksheet in the learning process. This worksheet serves as a real assessment instrument. Authentic assessment is the process by which the teacher collects information about student learning progress. This assessment is needed to find out whether students are really learning or not. Through the number and quality of students' worksheet answers, it can be assumed how involved students are during m-learning process.

2. RESEARCH method

The study used qualitative research with the narrative design. Narrative research designs are one of the qualitative procedures where researcher describes the things that happened during class, then collects and explains stories about students' lives and experience in the form of narratives [10]. Data collection technique that used is observation. In collecting data, the researcher has a role as non-participant in the study. In non-participant observation study, the researcher only watches and observe the activities in the class and not directly involves in the observed situation.

Thirty-five students of eleventh grade (12 boys and 23 girls), participated in this study. The instrument used to collect data in this study is a worksheet that is integrated in the APK which can be accessed by students via the student's smartphone and this worksheet is connected to Google Forms. The three worksheet contains questions related to the material content of sound waves consisting of: 1) Characteristic of Sound, 2) Interference, Superposition and Doppler Effect and 3) Application of Sound Wave. The sequence of worksheet questions is in line with the learning stage. The questions in the worksheet must be answered by students during the m-learning process. For teacher the answer worksheet, which is filled in by students, has two functions. The

number of answers, regardless of right or wrong, functions to monitor student involvement during the learning process and the quality of answers serves as an evaluation tool for students' understanding of the material contained in the APK-based teaching materials that have been developed. The results of the worksheet analysis become the basis for determining how involved students are during m-learning process. The worksheet answers are scored for each component. The equation used to determine the percentage of students' answer scores is as follows:

$$S = \frac{R}{N} \times 100\%$$

Information:

S: Percentage of implementation

R: Score obtained

N: Maximum score

Students' answers were assessed by the teacher using a rubric as shown in Table 1.

TABLE 1.

TABLE 1: Grading rubric.

Score	Criteria
0	If the student does not give an answer
1	If the student gives the wrong answer
2	If the answer given is correct but incomplete
3	If the answer given is correct and complete, but not perfect as expected
4	If the answer is perfect or appropriate

3. result and discussion

Through APK-based m-learning that we have developed, students can start or continue learning activities anywhere, even outside the classroom using their smartphones. In the learning materials that we have developed, there are: 1) home menu facilities, 2) learner schedules, and 3) contact teachers. In the home menu contains: 1) electronic books, 2) virtual practicums, 3) animated videos, 4) discussions, 5) games, 6) quizzes, 7) video tutorials, and 8) groups discussion as shown in the Figure 1.

During the learning process, each student will be assessed based on the worksheet as an authentic assessment. The APK-based m-learning activities include preliminary, core and closing activities like face-to-face learning. M-learning in APK-based sound wave learning was carried out three times (one lesson per week). At each learning, in

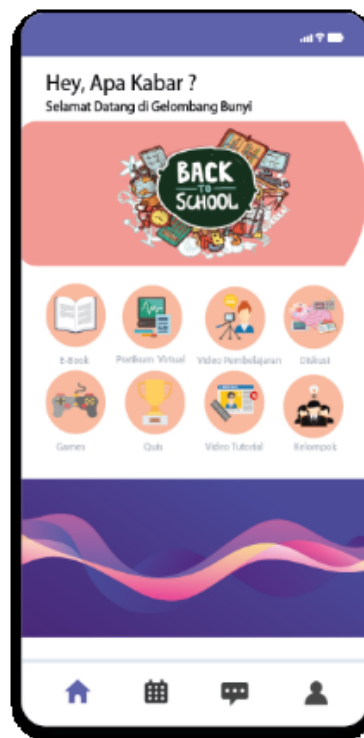


Figure 1: Contain of home menu.

the introductory, core and closing activities, students must answer several questions in the worksheet. Details of the number of questions and the average score of students answers every week are presented in the Table 2.

Increased student completeness in completing worksheets assignments as shown in Table 2, indicated that students in completing tasks on the increasingly increasing worksheet. It appears that at the first meeting the average score of student answers in answering worksheet questions was 87.2 and all of students gave answers, indicating that all of students were actively involved during the learning process and answered correctly the worksheet questions. Student answers tends to increase at the next meeting as indicated by the average score being 88 at the second meeting and 88.1 at the third meeting.

Description: Q1, Q2, Q3....Qn are Question number 1, 2, 3....n

Based on the number of students who answered the worksheet questions, it appears that students are continuously involved in the learning stages starting from the introduction, core and closing activities. The picture shows students' answers to the questions contained in the worksheet

The questions in the worksheet reflect the learning trajectory, while the student's answers serve as data for the teacher in obtaining authentic data on the learning

TABLE 2: Number of questions and the average score of students' answers worksheet.

Week of learning and material content	Average score of answers and the number of students who answered in each phase						Average Score
	Introductory activities	Total students	Core activities	Total students	Closing activities	Total students	
1 (Characteristic of Sound)	Q1 = 85; Q2 = 85	35	Q3 = 90; Q4 = 87; Q5 = 86; Q6 = 85; Q7 = 84; Q8 = 80; Q9 = 84; Q10 = 90 Q11 = 95; Q12 = 92; Q13 = 95	35	Q14 = 85 Q15 = 85	35	87.2
2 (Interference, Superposition and Doppler Effect)	Q1 = 95	35	Q2 = 85; Q3 = 85 Q4 = 92; Q5 = 90 Q6 = 85; Q7 = 87 Q8 = 87; Q9 = 90 Q10 = 90	35	Q11 = 85 Q12 = 82	35	88
3 (Application of Sound Wave)	Q1 = 90	35	Q2 = 80; Q3 = 85 Q4 = 90; Q5 = 92 Q6 = 95; Q7 = 87 Q8 = 85; Q9 = 90	35	Q10 = 90 Q11 = 85	35	88.1

sequence of students for all teacher teaching trajectories [11]. The number and achievement of worksheet answer scores reflect student involvement during m-learning. The number of worksheet answers regardless of right or wrong answers reflects that students are actively involved in the whole series of learning both at the introductory, core and closing activity. M-learning which is designed by following the learning stages is able to attract students' interest to access it and increase student involvement in learning [12, 13]. The achievement of the average score of worksheet answers with high criteria reflects the quality of the answers, this indicates that students access all available menus in the APK containing sound wave material content. Learning material that is designed in an attractive and easy-to-understand way will make it easier for students to learn it [14] [15].



Figure 2: Example of student answers to the second m-learning worksheet questions.

4. CONCLUSION

The results of the analysis show that in APK-based m-learning on the concept of sound waves in the first, second and third week of learning the average student worksheet answer score is high and all students provide answers to all questions in the worksheet. This shows that all students were actively involved during the learning process and the majority of students answered the worksheet questions correctly. It can be concluded that APK-based m-learning is an effective learning process.

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