

Implementation of Student Worksheets with Android-Based on Natural Science Subject

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ABSTRACT

This study was conducted because the student's learning outcomes were less successful. Based on the Midterm Assessment (PTS) evaluation at SDN 2 Mojo, 27 students (25%) were incomplete. Based on the data, the lowest value is 40, and the highest value is 80. The research adopts the ADDIE model with Mollena and Januszewski's theories: analyze, design, development, implementation, and evaluation. Research gets the following results: 1) Student Worksheet with the android system for Natural Science learning activities with style material created using the Android Studio application, operating through the lollipop type android system; 2) Student Worksheets with developed android systems included in the criteria were very feasible; Assessment was carried out by material and media experts with an assessment of the presentation component 90%, while the feasibility of content with a value of 92%; 3) The student worksheet was effective as a learning facility in Natural Science learning. The average pre-test value was 55.57143, and the post-test with a value of 80.88571. The t-test results showed that $t_{count} \leq -t_{table}$ with t_{count} calculation of -14,463 less than the t_{table} , which was -1.995469, then H_0 was rejected. N-Gain earned amounted to 0.569775. As a result, there was a difference in the value of Natural Science style material after using Student Worksheets or LKS android-based.

Keywords: *Student Worksheets, Natural Science Subject, Worksheets Android Based*

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INTRODUCTION

Sourced from information about learners and the implementation of class IV observations, midterm assessment results (PTS) in 7 subjects (Citizenship Education, IPA, Mathematics, IPS, SBdP, Indonesian, and Javanese), IPA subjects have the lowest average completion. Displayed by the data, there is complete student participation in learning, but students are still not following the Minimum Completion Criteria (KKM). This is indicated by the Midterm Assessment (PTS) value achievement. PTS results provide a report, there are learners with grades below KKM of 27 out of 36 people, the lowest score is 40, and the highest score is 80. It can say that classically 25% reached KKM, 75% have not reached the KKM standard. KKM for IPA subjects set in elementary school with a value of 71.

Natural Science Education (IPA) in schools must submit science to students to adapt according to the development and conditions of the times. Therefore, all teachers need always try to manage the learning activities of learners and teaching materials to realize Indonesian society following the purpose of national education, which is written in the Law of the Republic of Indonesia Number 20 of 2003. The law on the National Education System states that education aims to foster the resources of learners to become human believers and fear God Almighty, healthy, knowledgeable, capable, noble, independent, creative, responsible, and democratic citizens (Hidayati et al., 2016; Kintamani DH, 2012).

The impact of the development of information technology is a characteristic of the development of the world of education in the era of globalization. Adaptation use of information technology learning in line with technological developments, the world of education continues experiencing an increase the quality (Hadisi & Muna, 2015; Pratiwi et al., 2020). An application in smartphones, teaching and learning activities are based on android (Anita Adesti & Siti Nurkholimah, 2020; Mahfudin et al., 2021). Android is a complete, free, and open platform. The whole of technology is almost all areas of life due to its use in education to teach concepts theories and events (Sucilestari & Arizona, 2019). Technology is no exception to be used in Student Worksheets (LKS). Student Worksheet is a learning material that encourages students to establish knowledge independently and can motivate learners to participate actively in classroom learning activities (Aswarliansyah, 2020; Haifaturrahmah et al., 2020). One of the functions of the student worksheet is to guide the practice activities of learners. (Nurmaningsih & Wijaya, 2021).

LKS serves to guide students to carry out observation activities or an attempt to solve problems. LKS is a guideline to train development on cognitive aspects and a guide to developing aspects of learning in experimental or demo guidelines (Afannudin, 2019; Dazrullisa & Hadi, 2018). Learning using LKS has advantages and presents a direct experience to learners. Student worksheets are used for guidelines and guidelines for the implementation of learning and teaching activities (Nurhalimah et al., 2020; Riyanto et al., 2020). Student worksheets are used to guide learners in learning processes and activities. Being guided by Student Worksheets/LKS has a positive impact on teachers, which helps provide learning materials and assignments. Student worksheets contain several main activities that learners must do to optimize understanding to form basic abilities (Dazrullisa & Hadi, 2018).

Benefits of Student Worksheets or LKS are as follows: (1) assist the teacher in guiding learners to look for concepts through their independent activities or group cooperation; (2) used to develop process skills scientific attitudes, and arouse students' interest in the surrounding nature; (3) make it easier for teachers to control the success of students achieving learning goals; (4) it is easier to manage teacher-centered teaching and learning processes and activities, turning into student center learning activities (Ermi, 2017).

The advantages of LKS include: They are activating the role of learners in learning activities; They are helping learners to develop concepts; Training learners to seek and develop the teaching and learning process as a tool for teachers and students in teaching and learning activities. LKS can help learners add information about learning concepts, help learners get a record of the material learned in conducting learning activities, help teachers compile learning tools. Therefore learning activities in schools need to develop learning tools. LKS developed by educators as facilitators and

becomes a learning guideline, aiming learners can play an active role in teaching and learning activities (Afifah, 2018).

This study developed an android-based Student Worksheet to provide easy access to worksheets, facilitate work, and reduce paper use, thus supporting paper reduction. The children were enthusiastic about working on Android-based worksheets because it was new at the research location. Android-based worksheets get validation from media and material experts, so they have the feasibility to be used as learning media. This feasibility strengthens this study and is a differentiator from several other studies. The difference lies in the material specifications, teaching materials, and evaluation methods. Another activity is a limited effectiveness trial on fourth-grade elementary school students. The effectiveness test is intended to encourage better learning outcomes.

METHOD

The research uses the ADDIE pattern, which is divided into five stages, as follows; analysis, development, design, implementation, and evaluation. Implementation activities in class IV SDN 2 Mojo Boyolali Regency Central Java. Subjects in development research are: 1) class IV students of the 2018/2019 school year with a total of 35 people; 2) Grade IV elementary school teachers play a role in the collection of information; 3) Experts, expert lecturers or experts as examiners, also give criticism and advice on LKS with an android system consisting of two experts, namely: expert material and media experts.

Data collection techniques are done by means of tests and nontests. Nontest instruments consist of questionnaires, interview methods, and documentation. The research uses tests conducted at the beginning and end of learning. Data analysis in development research consists of three ways, namely: analyzing product data, preliminary data, and conducting data analysis at the end. Product data analysis is performed by expert validators using the Likert scale, while initial data analysis is used to detect the effectiveness of students' pre-test and post-test results by analyzing students' learning outcomes through normality tests. For final data analysis is carried out through three tests, namely: test Z, T-test, N-gain test.

RESULT AND DISCUSSION

Discussion of the results of research activities obtained in style materials in class IV elementary school, including 1) the LKS design with android-based; 2) the assessment results of expert validators; 3) Analysis of effectiveness data LKS android-based.

1. Student Worksheets or LKS Design with Android-Based

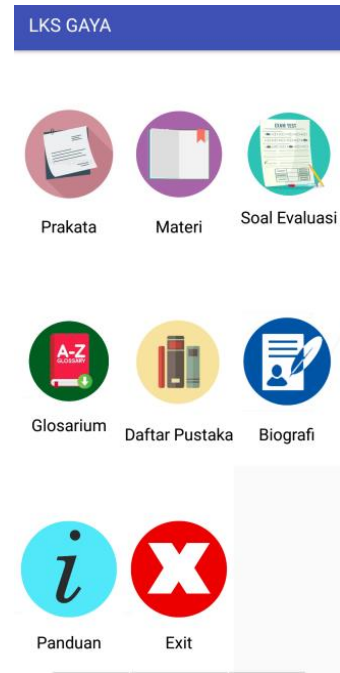
Based on the analysis of the needs of teachers and students, the preparation of LKS is done with the android system produced. The results of the analysis of the need questionnaire are used as guidelines for compiling media through research activities. Media is produced with attention to several aspects, namely: 1) aspects of content or material has a material charge, namely: the sense of force, influence of force, types of styles, and experimental examples of styles; 2) aspects of the material are started by presenting menu options briefly; 3) aspects of readability and language, used standard language. As for the text, the section used the typeface Times New Romans. Title writing using 18pt letter size and writing 12pt letter-size material; 4) aspect of graphics, enabled to pay attention to the display of media graphics produced.

The Android Studio app is used to develop LKS with the android system. LKS with the android system is designed for students that can be used in IPA Style material

learning activities in grade IV. In the android-based LKS, there are several displays, namely: (1) logo (2) cover page (3) preface (4) Basic Competencies, Core Competencies, indicator, (5) material, (6) practicum (7) about evaluation (8) glossary, (9) bibliography, (10) biography. Below is the view in LKS with android-based: **Figure 1**. Cover View



Figure 2. Menu View



2. Expert Validator Assessment

Student Worksheets / LKS with Android-based eligibility validator by material and media experts. Material experts conduct a feasibility assessment of material components, while media experts are tasked with assessing the feasibility of LKS presentation components with android operational systems.

Table 1. Media assesment

Assessor	Score Amount	Maximum Score	Percentage	Criteria
Material expert	23	25	92 %	Very feasible
Media expert	18	20	90 %	Very feasible

Assessment of expert feasibility of the material, including relevant to the content and purpose of learning, contains style material following the level of development of elementary students, clear and logical learning order, and the clarity of LKS android-based. The assessment gets a good response from the material validator, displayed through the value given with an average of 92%, so it falls into the criteria is very feasible. Based on the material expert, it needs to be fixed on the strictness in the android-based LKS. The material is declared very feasible following basic competencies to solve IPA problems, with a value of 92%.

Assessment of media experts' feasibility includes several parts: the function of the menu in the application, the presentation of images and balanced text, the presentation of content following the material, clear and interesting. In addition, pay attention to the aspect of using easy teaching materials. The assessment gets a good response from the media validator, and this is shown through the value given an average of 90%; the criteria are very feasible. According to media experts, LKS with an android operational system needs to be improved in the button addition and replacement section on the use of sentences.

3. Student Response Questionnaire Assessment

Student Worksheets are mentioned worthy by validators and revised; the process of further media is used in product trials. Small-scale product trials were conducted on 10 grade IV elementary students, consisting of 5 male students and 5 female students, with each other's abilities different according to the choice of the homeroom. Ten students were given LKS with the android system, instructed to operate, read activities and attempt to understand the contents of the LKS. After that, several things related to the material contained in the LKS to check students' level of understanding. In addition, learners are also instructed to give answers to evaluation questions located at the end classically. In the end, learners are instructed to fill out a response questionnaire to the research media. Student response questionnaire results are used as media improvement materials before being used in large-scale trials.

4. Teacher Response Questionnaire

A response questionnaire is given to determine the views of grade IV elementary school teachers on LKS with the android system. The teacher's response questionnaire is given after using LKS in IPA learning with style material. The results of the response received a good response, and there are 10 aspects of them; (1) overall media display, (2) learning activities using android LKS, (3) material contained in LKS, (4) insights contained in LKS, (5) language use, (6) aspects of LKS images, (7) fostering learning interest, (8) evaluation questions, (9) work instructions on LKS, and (10) ease in learning materials. All aspects get the best score, get a teacher response worth 98%.

5. Student Worksheets / LKS Effectiveness Analysis

Data collection of student learning results sourced pre-test results before doing LKS learning activities with the android system. Post-test value is obtained after the learning process with the LKS facility with an android system. The average pre-test value of grade IV elementary students is 55.57, while the average post-test result is 80.88. Learners who get complete grades during pre-test are 6 people (17.14%), while learners get complete grades when post-test numbers 35 people (98%).

Student learning results were collected, then tested normality using the Lilliefors test. This test is used to select statistical techniques. Based on the results of the normality test, it concluded that the pre-test and post-test data were distributed normally with the provisions of $Lo < Lt$, Lt or Lilliefors table for sample 35, which is 0.886, it is known that Lo pre-test data is 0.172, and known lo post-test data is 0.148.

The initial data analysis in the study is the normality test, which is used to determine the analysis of the final data, i.e., on the calculation of the t-test using parametric or non-parametric formulas. The normality test study used Lilliefors' calculations and calculated with Microsoft Excel applications. The normality test aims to determine whether the distributed data is normal. In this study, the data tested is

normality for student learning outcomes through pre-test and post-test grades. The normality of pre-test and post-test can be seen in the table below:

Table 2. Normality of Pre-test and Post-test

Action	Number of students	Average	Standard deviation	Lo	Ltable
<i>Pre-test</i>	35	55,57143	13,06834	0.172	0.886
<i>Post-test</i>	35	80,88571	5,758735	0.148	0.886

The results of the pre-test and post-test test in the table above show that with significance levels of 0.05 and $L_{table} = 0.886$, $L_0 = 0.172$ (pre-test) and $L_0 = 0.148$ (post-test) are obtained. The criteria for the assessment of normality is to reject the null hypothesis that the population is normally distributed if L_0 is obtained from surveillance data exceeding L from the list ($L_0 \leq L_{table}$), then the data is a normal distribution (Sudjana, 2005). The table above shows that for pre-test values show that $L_0 = 0.172 \leq L_{table} = 0.886$ then the data is normal distribution, and for post-test values show that $L_0 = 0.147 \leq L_{table} = 0.886$ then the data is normal distribution. The results of the normality test calculation for learning results based on table 2 above, it can be concluded that the data is normal distribution so that for the t-test, used is the Parametric formula.

Normally distributed data is then used to classically test the completion of learning, presented with the following table.

Table 3. Classic Completion of Student Worksheets or LKS Android-Based Usage

Grade	Number of students	Percentage of Completions	Zcount	Ztable	Information
<i>Pre-test</i>	28	6	-7,90479	1,96	Not Complete Classical
<i>Post-test</i>	28	35	3,41565	1,96	Complete Classical

Based on the results of the analysis, table 3 shows data that in the pre-test class obtained Zcount of -7.90479 and Ztable with a significance level of 0.05 of 1.96. So, in the Zcount pre-test class $< Z_{table}$ means showing that the criteria for completion of learning before using LKS with the android system are less than 75%. In the post-test class obtained, Z counted 3.41565 test proportion of one party with a significance level of 0.05, which is 1.96. So, in the post-test class, $Z_{count} > Z_{table}$ means showing that the criteria for completion of learning after using android-based LKS are more than 75%.

Table 4. Results of T Test Analysis

Action	Number of students	Average	Tcount	Ttable	Criteria
<i>Pre-test</i>	35	55,57143	-14,463	-1,995469	Ho rejected
<i>Post-test</i>	35	80,88571			

The table of t-test results for IPA learning results above displays data that the value of $T_{count} < -T_{table}$, which is $-14.463 < -1.995469$, it can be concluded that H_0 , meaning

the difference in pre-test and post-test values is less than zero. So, the pre-test value is less than the post-test value.

Table 5. N-Gain Test Results

Action	Number of students	Average	Difference in Average Value	N-Gain Value	Criteria
Pre-test	35	55,57143	25,31429	0,569775	Medium
Post-test	35	80,88571			

The table of N-Gain calculations of learning results calculated based on pre-test and post-test values shows that the data is 0.569775 and falls into the medium criteria, $0.30 < 0.56 < 0.70$. The table above shows an increase between the average pre-test and post-test grade IV graders on style materials using android-based LKS. This shows that LKS with the android system can be used as a support in the subject style material of IPA class IV SDN Mojo 2.

Based on the explanation above that LKS with the android system is effectively used in IPA style learning activities, according to previous research, there is an increase in student learning outcomes. Based on the results of a cycle I to cycle II, namely on the activeness of learners increased by 21.42%, and the skill score of learners by 14.28%, as well as tests of learners' learning outcomes by 28.57%. Based on research and discussion, it is concluded that the inquiry model with assisted LKS can improve the learning outcomes of learners in IPA subjects of magnetic force material (Fitriani et al., 2019). That way, it is concluded that LKS qualifies eligibility as teaching material and can encourage the improvement of learners' ability to solve problems.

Other studies also showed significant differences between the results of post-test experimental classes when using LKS and control classes that did not use LKS. The number of students who managed to get completed learning with KKM 75.00 was more significant in the experimental class, and the category was higher in the calculation of the increase in the field of problems in the experimental class. The conclusion of this study has a significant influence on the use of scientific approaches to IPA object material and its observation of IPA learning outcomes (Mustika et al., 2016). Other research results showed differences in the improvement of science literacy skills of students who used Problem-Based Student Worksheets (LKS) in IPA learning, with students who obtained Student Worksheets (LKS) not problem-based in IPA learning. The difference was significant after a two-time N-gain test with the Mann-Whitney test. Based on comparing the average N-gain of both classes, the use of Problem-Based Student Worksheets (LKS) is better for science literacy ability non-problem-based Student Worksheets (LKS) in IPA learning activities (Soepudin, 2018).

The use of learning media greatly impacts student understanding and learning outcomes (D. Setiawan et al., 2021; Deni Setiawan et al., 2021; Supriyono, 2018). Moreover, during the Covid-19 pandemic, where all learning activities are delivered online, teachers must be able to provide materials effectively and efficiently (Arigiyati et al., 2021). The feasibility assessment of media validators shows that applications assessed 86.93% of media experts and 87% of material experts. The trial results showed data on the ease and usefulness of application use by 87.5% by teachers and 82.27% when used by students. It can say that media is very feasible to use, easy, and useful in learning activities. The use of media is one component of achieving learning goals for

good results (Wulandari et al., 2019). The development of learning media in interactive math teaching materials based on the Android version of the Geogebra application is an effort to improve media-assisted learning outcomes. The research conducted in the odd semester of the 2017/2018 school year showing that in student achievement there are 75% of learners get excellent grades, the average activity is quite effective in the learning process, positive student response to teaching materials and students can do problems in LKS (Budiman & Ramdhani, 2017). Learning media helps improve learning outcomes (Fathurrahman et al., 2021). The android-based worksheets developed in this study can provide an increase in learning outcomes in science-style material.

Related research to solve style problems in science, with the help of LKS, can improve student learning outcomes (Fitriani et al., 2019; Syafi'ah & Laili, 2020). Other studies have found increased student learning outcomes on the concept of style using Student Worksheets (LKS) and problem-solving through brainstorming through divergent and convergent thinking processes (Puspitasari, 2018). To improve understanding of the concept of style and science, learning outcomes through experimental methods is carried out with the help of LKS (Rafika, 2016). Worksheets have proven successful in science learning based on a guided inquiry model to train students' mastery of concepts and critical thinking skills on style material (Nugraha, 2015). Learning related to the earth's gravity can be assisted through LKS to get satisfactory results (Ofan, 2019).

The results showed that the LKS IPA product material for classifying animals based on the type of food used a contextual approach with five stages, namely, observing, asking questions, gathering information/trying, reasoning, and communicating, proven to be able to improve learning outcomes (Aprilia et al., 2020). The results showed that learning science using the integrated science web-LKS in the peatland environment effectively increased environmental literacy in students (Hekmah et al., 2019). The CLIS learning model assisted by LKS media can improve science learning outcomes (Krismayoni & Suarni, 2020). The development of ICT-based science worksheets can improve student learning outcomes (Qomario & Agung, 2019). The development of character-packed worksheets can also improve science learning outcomes (Tarigan et al., 2019).

The most striking difference with previous research used in writing, some of the worksheets used are still in conventional and paper-based form. Although not the only Android-based worksheets, this research provides alternative forms of other conditions to help and make it easier for students to learn. In addition to being declared worthy by experts and having proven their effectiveness, Android-based worksheets can specifically contain the specified material and easily track for learning enrichment. One aspect raised in the feasibility and approved by the expert was that the Android-based LKS was easy and convenient.

This research has theoretical, practical, and pedagogical implications. The theoretical implication is that android-based worksheets help teachers to convey style material and stimulate students to understand the subject matter presented by the teacher. Practical implications of research, android-based worksheets can be used as a solution to create an exciting and fun learning atmosphere for students. The pedagogical implication of this research is to provide further description in developing student worksheets to improve student learning outcomes. This research has theoretical, practical, and pedagogical implications. The theoretical implication is that android-based worksheets help teachers to convey style material and stimulate

students to understand the subject matter presented by the teacher. Practical implications of research, android-based worksheets can be used as a solution to create an interesting and fun learning atmosphere for students. The pedagogical implication of this research is to provide further description in developing student worksheets to improve student learning outcomes. This study provides an overview of the development of worksheets that are interesting, innovative, and easily understood by students. This study provides an overview of the development of worksheets that are interesting, innovative, and easily understood by students.

The limitation of this research lies in the coverage area according to the specified location, SDN 2 Mojo. Based on identifying research problems, the activity is limited to the problem of science learning outcomes for fourth-grade students who are still low and the limitations of learning media used by teachers in teaching and learning activities that are not based on needs. Based on the initial study, a learning media in the form of an android-based worksheet was developed. This research can expand the coverage area not only in one class in elementary school but also can develop media in all classes, including involving schools in more coverage, so that it has a more significant impact.

CONCLUSION

Android-based Student Worksheets (LKS) can be operated on smartphones with Lollipop type, with environmental themes dominated by green. Some main menus include preface menus, materials, evaluation questions, glossaries, bibliography, biography, and guides and exit buttons. The feasibility test from experts obtained an average score of 91%. The teacher can use the LKS application with android system effectiveness in IPA learning activities of style material against student learning results with classical completion results, that in post-test obtained $Z_{count} = -7.90479 > Z_{tabel} 3.41565$, the average difference test with signification level of 0.05 is 1.96. T_{count} 13,552 and 1.995469. For booster information also obtained calculations using N-Gain of 0.569775 based on the difference in pre-test and post-test results.

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AUTHOR CONTRIBUTION STATEMENT

DS, as a major contributor, is tasked with validating and managing research data, including compiling research articles. EW, tasked with surveyors and data collectors and assisting in the data analysis and preparation of research articles. AH, is tasked with managing and evaluating research data before publication.

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