Improving Vocational High School Students' Learning Outcomes by Using Android-Based Problem Based Learning E-Student Worksheet

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Abstract. The purpose of this research is to produce Android-based E-LKPD as a solution to overcome the decline in learning outcomes, to find out the feasibility of the product, and to find out the differences in student learning outcomes. The product developed is in the form of an Android-based E-LKPD or project-based learning orientation. This type of research is development research with the adaptation of the ADDIE model. The test subjects consisted of media experts, material experts, and class X students majoring in MPLB SMKN 1 Turen. Processing data using quantitative and qualitative analysis techniques. Based on the results of the validation, the product being developed is declared feasible. The results of the analysis prove that the project-based learning-oriented Android-based E-LKPD can improve student learning outcomes in the cognitive, psychomotor, and affective domains, as evidenced by the difference in post-test results where the experimental class is larger than the control class. In addition, learning runs more conducive with interactive E-LKPD which is developed using Liveworksheets where students are more active in participating in learning because they are able to understand the material with the help of the developed media.

Keywords: Android · E-LKPD · Project Based Learning

1 Introduction

The lack of interactive learning media makes it challenging to establish an engaging and enjoyable learning environment. According to Kurniawati et al. (2018), the current use of learning media is confined to PowerPoint and YouTube videos, which makes it difficult for students to comprehend the goal and purpose of the material being transmitted. Unsatisfactory learning outcomes are acquired in the cognitive, affective, and psychomotor domains as a result of the continued use of monotonous methods and media for the delivery of the majority of content. This has a negative impact on the ability of students to comprehend the material being taught. Common is the use of technology as a learning medium in education, ranging from simple to complicated technologies (Lestari, 2018). The usage of instructional media is meant to improve the efficiency and effectiveness of learning. According to Tarigan and Siagian (2015), instructors have not

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optimally leveraged the availability of multiple learning mediums. As a result, the function of learning media to encourage pupils is not fully realized. An Android smartphone is one of the media that is believed to facilitate learning.

Due to the pervasiveness of Android devices in the lives of students, it is now possible to use Android as an interactive learning platform that is helpful to students (Lubis & Ikhsan, 2015). Educators can maximize the production of electronic teaching materials with the use of android as well as suitable media, infrastructure, and facilities from schools and private facilities held by students. Departing from the paradigm shift of pandemic-induced education, teaching materials have also been adapted to modern conditions through the use of technology, specifically electronic LKPD (E-LKPD). This is based on the benefits of E-LKPD, which are supposed to make learning more effective and efficient by reducing space and time requirements. Moreover, Syafitri and Tressyalina (2020) highlighted that the E-LKPD might be an interesting alternative when students lose interest or motivation in learning.

Based on information obtained through interviews with educators at SMKN 1 Turen as the teacher of the Basics of Office Management and Business Services subject for class ten, it was determined that all teaching and learning activities had been conducted offline, but that significant changes had been made to the curriculum. As part of the endeavor to reform Indonesian education, the Merdeka Mandiri Curriculum will be adopted beginning with the 2022–2023 school year. This curriculum integrates numerous disciplines into a single unit of new subjects, one of which is Office Management and Business Services Fundamentals. The introduction of the new curriculum, which was implemented for the first time in schools, necessitated a reorganization of learning plans and a review of instructional resources. The instructional materials are similarly restricted to a single PDF module that is provided via the class WhatsApp group. In addition, due to a lack of comprehension of the topic being studied, pupils act passively throughout class time because the module contains insufficient information. Furthermore, the sensation of boredom that inevitably occurs when class hours are extended hinders pupils' ability to concentrate on listening and learning. It is known that the inability of teachers to provide engaging learning media leads to a drop in student interest in learning, which has an effect on student learning results, particularly when learning tends to lead to theoretical material. This is supported by the activeness and learning results of students in classes that are dropping.

According to the collected data, the cognitive domain learning outcomes of students declined with a class average of 61,6 and the degree of student completion only reaching 14%. As for the psychomotor domain, the resultant scores are typically higher. Observational evidence indicates that pupils complete psychomotor tasks by replicating the work of their peers. The implementation of the new curriculum has made teachers more accommodating towards pupils, which has an effect on individual attitudes. Regarding evaluation activities, the instructor exclusively employs module-specific practice questions sent to pupils in PDF format. The pupils then create their own worksheets to answer the assessment questions. For psychomotor domain evaluations intended to measure skills, it was discovered that practicum questions were presented directly in class while students continued to create their own worksheets. Class X MPLB students at SMK Negeri 1 Turen who are learning the basics of office management and business

services do not have access to LKPD facilities, and the lack of interactive media used during learning causes a decline in interest in learning, which in turn causes learning outcomes to continue to decline until they fall below KKM. Such circumstances necessitate an immediate remedy so that learning activities can resume running properly and positively impact learning results (Widyastuti, 2021).

According to Kartini and Putra (2020), in order to maximize learning outcomes, it is vital to first stimulate students' interest in learning. In addition to the use of interactive media and instructional materials, the usage of learning models is one of the variables that contribute to the success of the learning process (Santoso, 2017). To facilitate the application of students' knowledge and abilities, it is necessary to adopt an appropriate learning paradigm, such as Project-Based Learning. This learning technique, according to Santoso (2017), can enhance students' comprehension and thinking. The application of Project-Based Learning to Android-based interactive E-LKPD is a novel learning medium that can enhance the quality of education by adapting to technology changes that are increasingly permeating all facets of life, including education.

Several studies involving the subject areas of Economics, Economic Mathematics, Science, Correspondence, Automation and Management of Personnel, Automation and Management of Infrastructure Facilities, Personnel Administration, Sociology, Physics, Accounting, and Business Economics have developed Android-based interactive E-LKPD with a project-based learning model to improve student learning outcomes. (Hamda, 2017; Nasrullah et al., 2018; Haryanto et al., 2019; Izza & Pahlevi, 2019; Putri, 2019; Rahmanto & Rosy, 2019; Rizki & Ranu, 2019; Elfina & Sylvia, 2020; Hidayah et al., 2020; Fitriyah & Ghofur, 2021; Prabowo, 2021; Nufus & Sakti, 2021; Maharani et al., 2021; Sianturi et al., 2022). However, what distinguishes this research from past studies is the use of appealing and interactive learning material created with the use of a free web application called Liveworksheets. Some of the practicum-related resources will also be packed in an audio-visual format. The presentation of learning materials will be more succinct and clear, without compromising the essential information to be communicated. Additionally, essential information will be provided in audio format. The incorporation of audio as a manner of presentation that clarifies the major points of the discussed subject is meant to prevent student boredom. In compiling student worksheets as evaluation material, it also presents a sort of light game evaluation to prevent student boredom using a third website, WordWall, and numerous questions created directly on Liveworksheets using easy scripting. With the introduction of E-LKPD learning media, it is envisaged that students will be more engaged in learning activities, hence enhancing their comprehension and learning outcomes. This research aims to produce teaching material products in the form of Android-based E-LKPD by applying a project-based learning model, particularly for the fundamentals of office management and business services, to determine product feasibility through a validation process, and to determine the impact of product use on participant learning outcomes. educate.

2 Method

Adapting the ADDIE paradigm, research and development (Research and Development/R&D) was chosen as the approach for this study. The ADDIE model was built systematically and on the basis of learning design theory, making this development model

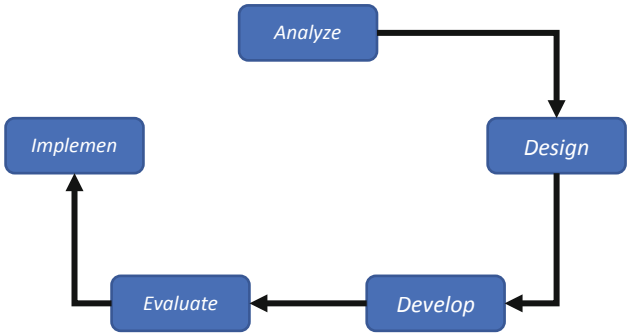

Fig. 1. Modified ADDIE Model

worthy of research consideration (Tegeh & Kirna, 2013). The researcher selected the ADDIE model because it is regarded as easier, more organized, and extensively utilized for creating programs and learning items, such as those generated for this study. Cahyadi (2019) describes five sequential stages of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation, which are then adjusted by researchers in accordance with the research flow. Namely: (1) Analyze (Analysis); (2) Design (Planning); (3) Development; (4) Evaluate (Evaluation); and (5) Implementation (Implementation). These modifications were made since the evaluation phase was meant to be revised (improved) prior to research application. The redesigned steps are depicted visually in Fig. 1.

This investigation began at SMK Negeri 1 Turen during August and September of 2022. This study's participants included media specialists, material specialists, small groups, and large groups. Media specialists are professors who comprehend and study the IT area. This study's subject matter expert is the appropriate subject educator. Six randomly selected students from class X MPLB at SMK Negeri 1 Turen comprised the study's small group. Regarding the large group, two classes were chosen: class X MP 1 with 36 students as the experimental class, and class X MP 3 with 34 students as the control class.

Quantitative data and qualitative data are the sorts of data collected during the study process. Quantitative data consists of product validity data derived from an assessor's assessment score, product efficacy data derived from a post-test, and product usability data derived from a questionnaire. While qualitative data was acquired through reviews of recommendations, comments, and criticism from the validator and interviews with students and instructors, quantitative data was obtained through surveys. This study included interviews, tests, documentation, and questionnaires to obtain data. Unstructured interviews are a sort of interview in which open-ended questions are asked. Writing tests and practicum are used to obtain data through testing. Documented data gathering is accomplished by analyzing and studying existing written data. Finally, this research and development issued three sorts of questionnaires: media expert questionnaires, material expert questionnaires, and user questionnaires to assess the product's practicality.

Quantitative and qualitative data analysis methods are employed in this research. The outputs of expert validation, small group trials, and post-test student learning outcomes

were used to generate quantitative data. On the basis of an assessment questionnaire that had been submitted to the validator and would be examined for product revision, qualitative data surveys were administered. Qualitative data consists of study subjects' comments, ideas, notes, and criticisms. Experts and small groups' data validation findings were assessed using a descriptive percentage method. While data on student learning outcomes were analyzed using the percentage of class average scores to demonstrate differences in learning outcomes between the experimental class and the control class, the percentage of class average scores was used to show differences in learning outcomes between the experimental class and the control class.

The analysis of the trial participants' questionnaire data was calculated using the percentage data analysis technique and the following formula.

$$v - ah = \frac{Tse}{Tsh} \times 100\% = \ldots\%$$

$$v - pg = \frac{Tse}{Tsh} \times 100\% = \ldots\%$$

Annotation:
V-ah: Expert validation
V-pg: User validation
Tse: Total of empirical score
Tsh: Maximum score
100%: Constants

Then the results obtained based on the percentage score are assumed to be the level of media feasibility. The validation criteria and questionnaire assessment are presented in Table 1.

The evaluation scores of multiple-choice formative tests, brief entries, and descriptions can be used to conduct an analysis of cognitive learning outcomes. If a student's grades meet or exceed the Minimum Completion Criteria (KKM), he or she is considered to have achieved mastery in the subject. The formula used to calculate learning outcomes is as follows:

$$\mathrm{N} = \frac{w}{n} \times 100$$

Annotation:
N: Scores obtained by learners

Table 1. Questionnaire Validation Criteria

Score Range	Validation degree
>80%	Very valid, can be used without revision
61–80%	Fairly valid, usable but needs minor improvements
41–60%	Invalid, needs major improvement, it is recommended not to use
<40%	Completely invalid, unusable

Table 2. Psychomotor Assessment Score Indicators

No	Indicator	Skor
1.	Very complete, appropriate, precise and completed before time	5
2.	Complete, appropriate, precise and completed before time	4
3.	Quite appropriate, right and according to the time specified	3
4.	Less appropriate, less precise and too late	2
5.	Little work, no fit, and finished too late	1

w: Number of questions correct

n: The number of questions

Analysis of psychomotor learning outcomes is carried out by providing practicum to see the skills of students. Indicators in psychomotor assessment can be seen in Table 2.

To determine psychomotor learning outcomes, an assessment rubric is made as a guide in scoring or grades. The assessment rubric consists of four aspects, namely work preparation, process, work results, and work attitude. Then the values obtained from the cognitive and psychomotor domains are then calculated by the class average using the following formula:

$$\bar{x} = \frac{\sum xi}{N}$$

Annotation:

x-: class average score

Xi: the score obtained by the learner

N: number of students in the class

If the average score of the experimental class is higher than the control class, then the project-based learning-oriented Android-based E-LKPD is proven to be able to improve student learning outcomes in the Basics of Office Management and Business Services subject. However, if the average score is the other way around, then it is not proven that the developed E-LKPD is capable of boosting student learning outcomes.

The affective domain assessment has a target, namely the behavior of students during learning with several aspects that are assessed including aspects of cooperation, discipline, honesty, responsibility, to the activeness of students. To facilitate the assessment of student behavior, an assessment score indicator is made as shown in Table 3.

The results obtained will be concluded with the percentage of scores obtained which are assumed to be the results of learning the affective domain of students. If the percentage score obtained for the experimental class is greater than the control class, then the product developed is proven to be able to influence students' attitudes in a more positive direction. However, if the acquisition of the percentage score applies otherwise, the product developed will not have an effect on the attitude of students.

Table 3. Indicators of Affective Assessment Scores

No	Indicator	Skor
1.	Very good	5
2.	Good	4
3.	Moderate	3
4.	Poor	2
5.	Very poor	1

3 Results

The results of this research and development are in the form of project-based learning-oriented Android-based E-LKPD which is made using the help of a free online web, namely Liveworskheet. There are two accesses provided by Liveworksheets, namely Teacher Access and Students Access. Teacher access is enabled for teachers or educators who want to make interactive E-LKPD while Students access is enabled for students. This study used the Research and Development (R&D) method by adapting research and development procedures from the ADDIE model. The stages of the ADDIE model have been adjusted by researchers to be applied to this research and development.

3.1 Research Stage

Analysis as a first step was carried out through an offline interview process with teachers who teach the Basics of Office Management subject at SMK Negeri 1 Turen. It is known that at SMKN 1 Turen an Independent Curriculum has been implemented which changes the learning structure starting from combining several subjects into one new subject, changing the name of the OTKP department to MPLB, and replacing the syllabus with the Learning Objectives Flow (ATP). The Basics of Office Management subject was chosen because of the lack of resources, media, and teaching materials in these subjects. The lack of learning tools is due to the fact that these subjects are one of the new subjects that are formed from several previous subjects that were put together. Element two regarding the development of technology application and global issues in office management and business services was selected as research material according to the time of research. So far, students only have one source of learning, namely modules in PDF format, while students still make their own worksheets.

The second stage is the design (planning) in which the researcher collects materials for making the E-LKPD. Designing products, and determining expert validators. Making the cover of the E-LKPD uses the Photoshop CS6 application, while arranging the layout of the contents of the LKPD uses Microsoft Word. Furthermore, for the development stage, the initial draft of the product is finished and ready for due diligence by the validator. Access to the E-LKPD that has been developed through Liveworksheets requires a user account first and students must join the class group that has been created by the researcher. Learners can join by entering the shared class code.

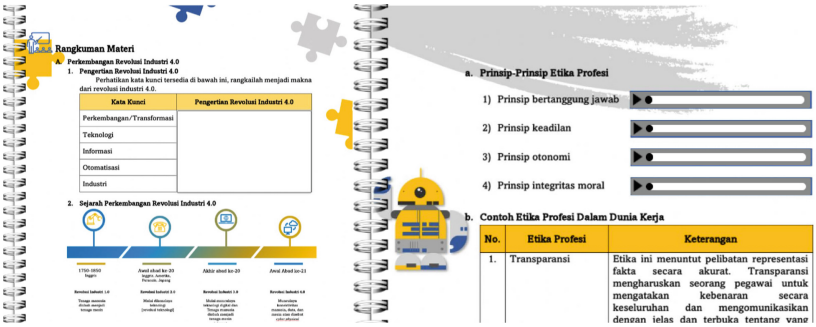

Fig. 2. Topics Presentation

The E-LKPD has 79 pages including the cover page, then divided into 20 sections. Before moving to the next section/section, students must press "Finish" at the end of the section. The goal is that the progress that has been made in the section/section is stored and corrected automatically by the system and generates a value. When the user chooses finish, the answer cannot be changed. The material is packaged in four models, namely text, audio, video, and light games such as assembling keywords to form one sentence that explains the meaning of the learning topic. There is an additional feature titled Info at a Glance which provides a bit of additional information related to the topic being discussed. Presentation of the material as shown in Fig. 2.

Evaluation questions on the E-LKPD are divided into three segments, namely Enrichment, Knowledge Test, and Skills Test. Enrichment is contained in each topic in the material which aims to hone students' memory after studying the material. This segment can be in the form of questions for the cognitive domain as well as for psychomotor assessment. The Knowledge Test is a segment at the end of each chapter that focuses on cognitive evaluation. The Knowledge Test is used as a reference for conducting the final test. This segment consists of three parts, namely multiple choice, entries, and descriptions. The entries are packaged in a variety of different questions for each chapter, starting from drag-drop, drop-down, and crossword puzzles. The Skills Test contains an evaluation of the practicum domain that is at the end of each chapter after the knowledge test. The questions in the skills test are designed to be worked on in groups and collected via the Google Drive link. Presentation of evaluation questions is presented in Fig. 3.

Next is the validation stage by experts (media and materials). From the results of the validation questionnaire, qualitative and quantitative data were obtained. The first validation was carried out by media experts. The media expert validation test data contains aspects related to the appropriateness of presentation, language, and media use. The results of the media expert's assessment are shown in Fig. 4.

In Table 4 regarding the validation results from media experts, it is known that the total score for each aspect is assessed with a feasibility percentage of 80%. This states that the product made is in a valid enough category and can be used as teaching material with minor improvements according to the eligibility criteria. The second validation was carried out by material experts. Material expert validation test data contains material aspects and benefits. The results of the media expert's assessment are shown in Fig. 5.

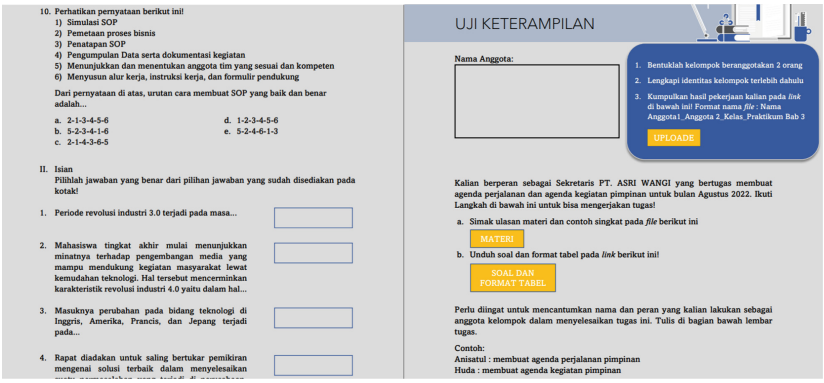

Fig. 3. Evaluation Sheet

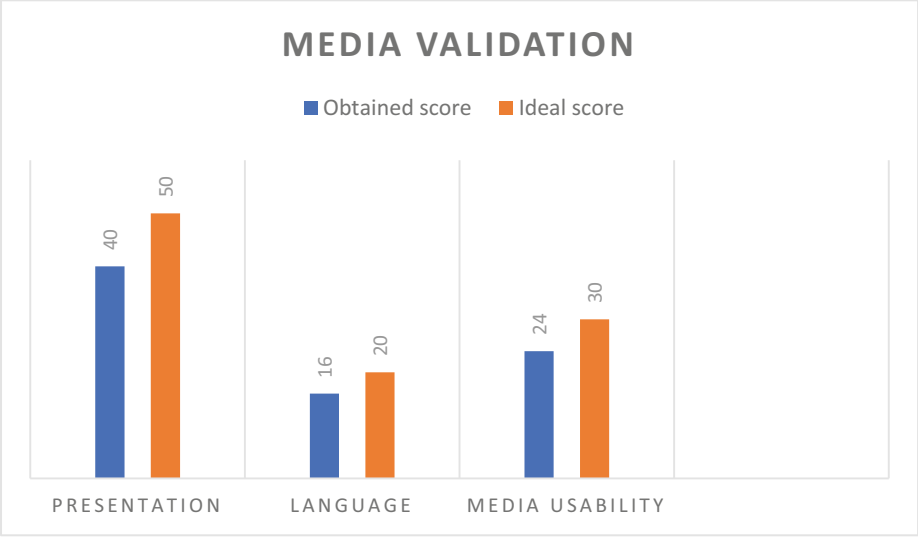

Fig. 4. Media Validation Results

Based on Fig. 5, it is known that the total score of the material aspects and the aspects of the benefits obtained from the validation of material experts is 86 points out of a maximum total of 100 points. In more detail, it is explained in Table 5 regarding the acquisition of scores for each aspect.

In Table 5 regarding the validation results from material experts, it is known that the total score for each aspect assessed with a feasibility percentage of 86%. This states that the product made is in a very valid category and can be used as teaching material with minor improvements according to the eligibility criteria. The fourth stage is evaluation, in which at this stage the E-LKPD product is improved according to suggestions, input and comments from expert validators. However, suggestions for improvement from material experts cannot be corrected because they are automatically programmed by

Table 4. Media Validation Results

No	Aspects Assessed	Ideal Score	Score Obtained	Suggestion
1.	Presentation	50	40	– Table of content must be included – Revise the numbering – Revise the footer
2.	Language	20	16	
3.	Media usability	30	24	
Total		**100**	**80**	
Validity percentage		**80%**		

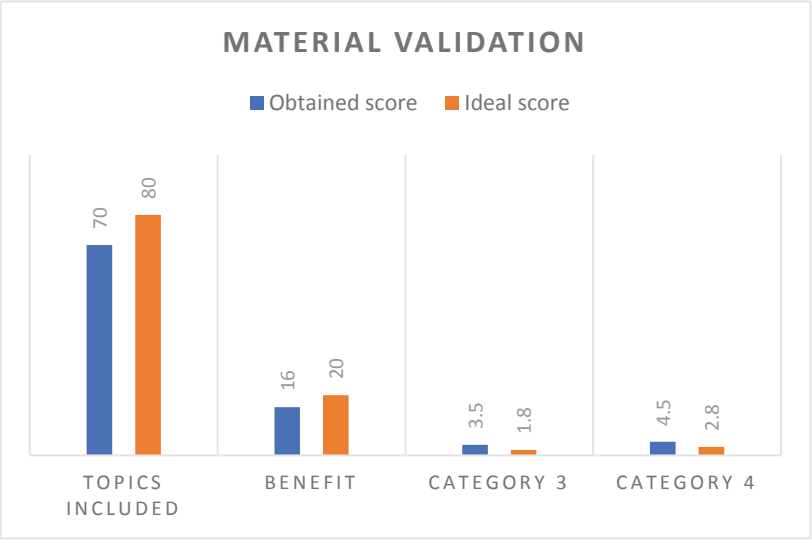

Fig. 5. Material Validation Results

the liveworksheets system. To avoid the occurrence of multiple choice answers, the researcher gave instructions for working on the questions in each section of the evaluation questions.

The final step is implementation. At this stage, products that have been declared valid and have been revised are then implemented in class in actual learning situations. Before being applied to large groups, the product was first tested on a small group of six people with a random sample selection. Small group trials are a stage of activity to determine the feasibility and interactive Android-based E-LKPD orientated project based learning in the subject of Fundamentals of Office Management and Business Services. Small group trials yielded both quantitative and qualitative data. Quantitative data will be displayed in Fig. 6.

Based on Fig. 6, it shows the score obtained and the percentage level of validation of the E-LKPD product from a total of six respondents. The scores of all respondents are then added up to be calculated using the formula and it is known that the percentage of

Table 5. Material Validation Results

No	Aspects Assessed	Ideal Score	Obtained Score	Suggestion
1.	Topics Included	80	70	This Android-based E-LKPD is quite effective for learning in productive subjects, especially in the MPLB expertise competence, although there are some application features that need to be perfected, for example in the assessment, the results need manual correction because if there are two answers selected and one of them is correct, then the answer is considered correct..
2.	Benefit	20	16	
Total		**100**	**86**	
Validation Percentage		**86%**		

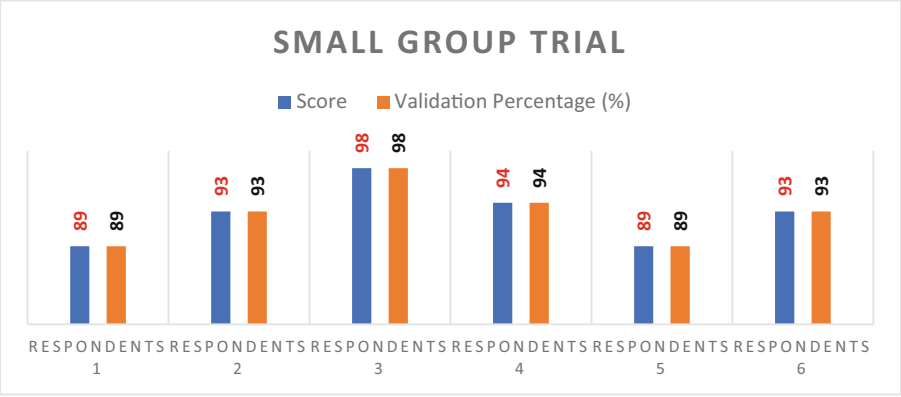

Fig. 6. Small Group Trial Results

product feasibility is 92.7%. Based on the results of small group trials on the developed E-LKPD product, the validity criteria are in the "Very Eligible" category. So the product is very suitable to be used as teaching material for actual learning. After that, the product will be applied to large groups, namely class X MP 1 as the experimental class and X MP 3 as the control class using Power Point.

3.2 Trial Results Analysis

During the research, students were first taught about the development of the industrial revolution 4.0, modern office concepts, types of office technology, office automation

Table 6. Results of the Cognitive Domain Assessment

	Experimental Class (X MP 1)	Control Class (X MP 3)
Number of students	36	34
Total value	3012	2604
Completeness level	100%	71%
Grade point average	83.7	76.59
Difference in results	7.08	

concepts, types of office facilities, office environment concepts, office work standard concepts, and environmentally friendly office work culture before working on evaluation questions on the E-LKPD that have been made. The experimental class uses the E-LKPD that has been developed for material summary and evaluation questions, while the control class uses other media, namely PowerPoint, to then be given post-test questions for each trial class. Data on student learning outcomes were obtained from a comparison of the post-test scores given to 36 students in the experimental class and 34 students in the control class. After obtaining the value of students, the value calculation is carried out. Analysis of the results of the trial consisted of an analysis of learning outcomes in the cognitive, psychomotor and affective domains.

The researcher gave a post-test in the form of 10 multiple choice questions, 10 questions filled in, and 5 question descriptions to the experimental class and control class to measure cognitive learning outcomes. The acquisition of cognitive learning outcomes is presented in Table 6.

Based on Table 6 regarding the results of the cognitive aspect (knowledge) assessment, it is known that the average gain of the experimental class after taking the post-test was 83.7, while the control class was 76.59. The class average difference is 7.08. Furthermore, the completeness level of the experimental class was perfect with 100% while the control class only touched 71%. There is a difference that distinguishes learning outcomes and the level of completeness between the experimental class and the control class, so there is a positive impact in the form of increasing student learning outcomes by using interactive Android-based E-LKPD oriented project based learning.

Calculations of learning outcomes in the psychomotor domain were obtained from practicum activities for making financial reports and recapitulating student learning outcomes with Excel which were carried out by large groups. The practice is carried out offline in the learning process in the last week of September. The assessment of the results of the two classes' practice is presented in Table 7.

Based on Table 7, it is known that the average acquisition of experimental class students' practice results reached 90.1, while the control class was 86.7. The average gain difference between the two classes is 3.4. The difference in the average acquisition of psychomotor learning outcomes between the two classes proves that there is a positive impact in the form of increasing learning outcomes by using interactive Android-based E-LKPD or project-based learning. The difference in learning outcomes in the cognitive and psychomotor domains is relatively small, because the learning process is explained using

Table 7. Results of the Psychomotor Domain Assessment

	Experimental Class (X MP 1)	**Control Class (X MP 3)**
Number of students	36	34
Total value	3244	2947
Grade point average	90.1	86.7
Difference in results	3.4	

Table 8. Affective Assessment Results

	Experimetal Class (X MP 1)	**Control Class (X MP 3)**
Number of Students	36	34
Total value	3404	3024
Grade point average	94,6	88,9
Very Good (SB)	36	18
Good (B)	–	15
Good Enough (CB)	–	1
Less Good (KB)	–	–

the same method but the differences in the media used. Through the explanation from the researcher, it is known that students are far more able to understand the material than when taught by the teacher where no learning media is used from either the control class or the experimental class. However, the experimental class remains superior because during the lessons on the E-LKPD used there is a summary of the material which is packaged into a simple game form, namely concluding the meaning of the learning topic. Students in the experimental class are always asked to interpret the learning topics that will be discussed in their own language by combining the keywords that have been prepared so that the experimental class students understand the material more deeply than the control class. Meanwhile, based on observations, the learning outcomes of the control class for the psychomotor domain did increase, but the increase occurred because students asked colleagues who had finished working on them. Some students were also found to copy the work of other groups by changing some aspects so that there were differences.

The value of the affective domain was obtained from assessing students' attitudes during the post-test implementation in the last week of September. The assessment was carried out offline for the control class and the experimental class. The attitude assessment of the two classes is presented in Table 8.

Based on the data in Table 4.11, it is known that the experimental class students obtained an average affective score of 94.6 while the control class was 88.9. The affective value of the experimental class on all students gets Very Good criteria (SB). While the affective value in the control class was known that 18 students got Very Good criteria

(SB), 15 students got Good criteria (B), and 1 student got Fairly Good criteria (CB). So that there is a difference in the average affective value of the experimental class and the control class where the experimental class has a value that is superior to the control class. So, the use of project-based learning-oriented Android-based E-LKPD using the Liveworksheets.com site has a positive impact that can influence student attitudes, while the control class does not use E-LKPD, the average attitude value is still below the experimental class because on the media used for the control class there are no clear written work instructions as in the E-LKPD.

This research and development resulted in new findings in the form of project-based learning-oriented android-based E-LKPD as teaching materials for a new subject, namely Fundamentals of Office Management and Business Services which have been proven to create an interactive learning atmosphere so as to have a positive impact on student learning outcomes. This is relevant to the research conducted by Fitriyah & Ghofur, (2021) regarding efforts to improve critical thinking skills and student learning outcomes by developing an Android-based E-LKPD which is proven to make it easier for students to engage in independent learning activities. This is evidenced by the learning outcomes of students who experienced an increase in the percentage reaching 85%. Ratnawati, (2021) also conducted research and development of E-LKPD with the help of the Liveworksheets website. It was found that the E-LKPD assisted by Liveworksheets was declared practical and easy to operate and boosted learning outcomes. It is proven that the students' daily test results have increased with the acquisition of an average score of 78.69 and 79.56.

Learning with E-LKPD teaching materials that are operated using android media orientated with project-based learning models is able to guide students to master the material through an interesting (not monotonous) learning style, helping the learning process to be more practical because students do not need to make their own worksheets, and help improve students' skills with the practice provided. In addition, it also helps students play an active role in teaching and learning activities because some material summaries in the E-LKPD are packaged in the form of light games that ask students to understand the meaning of the topics being taught. The learning process also runs more interactively so that students are motivated to take part in learning so that it has an impact on learning outcomes. For teachers, this E-LKPD will be an alternative to teaching materials and other learning media that are more interactive besides the modules previously used.

4 Conclusion

Judging from the validation from the expert validator, the response of the test subjects to the small group and the learning outcomes of the large group, the final product obtained is in the form of an Android-based E-LKPD orientated project based learning which was developed using the liveworksheets.com website in the Basics of Office Management subject and Class X Business Services Department of Office Management, declared to meet the established criteria and are suitable for use in learning activities as teaching materials that can be used in any condition because of their practical shape and use android media which is flexible for time and place. The conclusions drawn based on the

calculation results obtained, the developed E-LKPD has an impact on improving student learning outcomes for the affective, psychomotor, and affective domains.

Suggestions for further research, you should insert all the links used so that the entire research process uses the product being developed sufficiently. Use clearer audio to package material for easy listening. Further research is needed regarding software that can be used besides Liveworksheets to code various questions because Liveworksheets has a weakness in the system, namely in multiple choice questions, students can still choose multiple answers and will be considered correct if one of the answers the student chooses is correct. It is also recommended to use more examples that are easy for students to understand, because students can easily understand when associated with realistic examples around them.

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