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Development of Project Based Learning (PjBL) E-LKPD Assisted by Liveworksheets Application on Statistics Material

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ABSTRACT

This research is motivated by the lack of use of electronic media or digital teaching materials in the learning process and students who have difficulty solving problems related to statistics material at SMAN X in Padang. The purpose of this study was to develop a project-based E-LKPD assisted by the application of liveworksheets on statistical material for class X SMAN X in Padang which is valid and practical. This type of research is development using R&D with a plomp development model. The stages used in this development model only reached stage 2, namely the prototyping phase which concurrently tested the validity and one-on-one tests which were useful for seeing the practicality of the E-LKPD by teachers, small group test questionnaires which were useful for seeing the practicality of E-LKPD by students and interview guidelines. Based on the validator's assessment, the results of the validity of the E-LKPD assisted by the liveworksheets application were 91% with a very valid category. The results of practicality with the teacher obtained a final score of 96% in the very practical category. The results of the one-on-one practical test obtained a final score of 92% in the very practical category. The results of the small group practicality test obtained a final score of 88% in the very practical category. Based on the results of the study it can be concluded that the E-LKPD assisted by the liveworksheets application on statistics material at SMAN X in Padang is stated to be valid and practical for use by teachers and students.
Keywords: E-LKPD, Liveworksheets, statistics

ABSTRAK

Penelitian ini dilatarbelakangi oleh kurangnya pemanfaatan media elektronik atau bahan ajar digital dalam proses pembelajaran serta peserta didik yang mengalami kesulitan untuk menyelesaikan permasalahan yang berkaitan dengan materi statistika di SMAN X di Padang. Tujuan penelitian ini adalah untuk mengembangkan E-LKPD berbasis project based learning (PjBL) berbantuan aplikasi liveworksheets pada materi statistika kelas X SMAN X di Padang yang valid dan praktis. Jenis penelitian ini adalah penelitian pengembangan menggunakan R&D (research and development) dengan model pengembangan plomp. Tahapan yang digunakan dalam model pengembangan ini hanya tahap 1 sampai tahap 2 yaitu tahap investigasi awal dan fase prototyping yang merangkap uji validitas dan uji satu-satu yang berguna untuk melihat kepraktisan E-LKPD oleh guru, angket uji kelompok kecil yang berguna untuk melihat kepraktisan E -LKPD oleh peserta didik dan pedoman wawancara. Berdasarkan penilaian validator, diperoleh hasil validitas E-LKPD berbantuan aplikasi liveworksheets sebesar 91% dengan kategori sangat valid. Hasil praktikalitas dengan guru memperoleh nilai akhir 96% dengan kategori sangat praktis. Hasil uji praktik satu-satu dengan 3 peserta didik memperoleh nilai akhir 92% dengan kategori sangat praktis. Hasil praktikalitas uji kelompok kecil dengan 9 peserta didik memperoleh nilai akhir 88% dengan kategori sangat praktis. Berdasarkan hasil penelitian dapat diartikan bahwa E-LKPD berbantuan aplikasi liveworksheets pada materi statistika di SMAN X di Padang dinyatakan valid dan praktis untuk digunakan oleh guru dan peserta didik.
Kata kunci: E-LKPD, Liveworksheets, Statistika
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Introduction

Education is an important thing in human life, this means that every human being has the right to get it and is expected to always develop in it, education will never end, education in general means a process of life in developing each individual to be able to live and carry on life, so that an educated person is very important (Anisah et al., 2023). Pendidikan merupakan proses pembelajaran yang dilakukan untuk membantu seseorang dalam belajar, pendidikan juga termasuk sarana prasarana yang tepat dalam membentuk masyarakat berbangsa yang ideal, beragama, berbudaya dan juga cerdaskehidupan, sehingga menjadi seorang yang terdidik itu sangat penting (Putri et al., 2022). Education is the main foundation that must be seriously improved and designed to tread progress in the development of the nation. Besides that, one of the things that must be designed structurally in education is the curriculum (Tussholeha et al., 2023).The curriculum implemented in schools at this time is the Independent Curriculum. One of the main characteristics of the independent curriculum is that schools are given independence to provide learning projects that are relevant and in accordance with the local wisdom of the school. Local wisdom is very important in learning, especially in making projects because according to regional conditions, students are easy to recognize and easy to find (Hardiyanti et al., 2020).

The Free Learning Curriculum is a new policy program of the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI) which was proclaimed by the Minister of Education and Culture of the Indonesian Advanced Cabinet. The essence of freedom of thought, according to Nadiem, must be preceded by teachers before they teach it to students. Nadiem said, for teaching competence at any level, without a translation process from the basic competencies and existing curriculum, there will never be learning that takes place (Hasim, 2020).

Learning activities that do not involve mental and physical processes make students passive and result in them having difficulty learning mathematics and not being able to solve problems independently (Fajri, 2019). Many students do not understand the material that has been taught, so that when solving the questions given, students do not answer correctly, many students make mistakes in the process of solving questions, students cannot understand the meaning of the questions well, and students are less careful in working on questions (D. N. Sari et al., 2022). If we want to give students problems that have a direct impact on their lives, they will most likely be willing to engage in the process of mathematical modeling (Spooner et al., 2024).

Strengthening the profile of Pancasila students focuses on cultivating character as well as abilities in daily life instilled in individual students through school culture, intra-curricular and extra-curricular learning, projects to strengthen Pancasila student

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profiles as well as Work Culture Kerja (Rahayu et al., 2021). Students can collaborate with the guidance and monitoring of the teacher to be able to solve these problems. Such learning can be carried out using appropriate learning examples, similar to the Project Based Learning model.

Project Based Learning is "a learning process that directly involves students to form a project". The point is that this learning model develops more solving skills in working on a project that can produce something. In its implementation, this model provides broad opportunities for students to make decisions in determining topics, conducting research and completing a particular project. Learning by using the project as a learning method. Students work concretely, as if there is a real world that can form products realistically (R. T. Sari & Angreni, 2018).

Mathematics is one of the subjects that has an important role in school, mathematics is a widespread science because it is used by various teaching and is used in everyday life (Ramadoni & Boas, 2023). Mathematics is a subject that has an important role in increasing the progress of science and technology (IPTEK). This causes mathematics to be a subject taught from elementary school to university (D. N. Sari et al., 2022). Mathematics itself is one of the subjects in the adaptive group which is intended to apply science and technology, produce competence, skills, and work independence. Students are provided with mathematics subjects with the aim of preparing graduates to become skilled workers and have the provision of mastery of the profession. Through learning mathematics, it is hoped that students can develop critical, logical, systematic, careful, effective and efficient thinking skills in solving problems (Wulandari & Suryowati, 2023). One of the learning efforts that can overcome these problems is to apply the Project Based Learning (PjBL) learning model. Project Based Learning (PjBL) is a learning model whose core activities are implementing project-based activities. By using this model, students can create their own problems and find their own solutions (Arisanty, Hastuti, Setiawan, 2020). With this in mind, in learning mathematics at school, teachers should be able to choose and use strategies, approaches, methods and media that involve students in learning, both mentally, physically and socially so as to create active and creative and independent mathematics learning (Astuti, 2016).

The liveworksheet application is an application provided free by the Google search engine. This app allows teachers to turn traditional printable worksheets (documents, pdfs, jpg or png) into interactive, auto-correcting online exercises. Students can work on worksheets online and send their answers to the teacher also online. The advantage of this application is that it is good for students because it is interactive and motivating, for teachers this application saves time and saves paper (liveworksheet.com/about)

(Prastowo, 2013). LKPD using Liveworksheets is an interactive LKPD that can be prepared by teachers via the site https:/ /www.liveworksheets.com (Andriyani et al., 2020) states that through LKPD using live worksheets, teachers can change traditional worksheets into interactive online exercises and correct LKPD answers using live worksheets LKPD online and sending answers to the teacher so that apart from motivating, it can also save time and paper. Statistics is a science that includes processes related to the stages of data collection, data processing, data analysis, drawing conclusions so as to arrive at a conclusion that has a basis. facts (Nasution, 2021).

Research Methods

This type of research is research and development (R&D). Research and development methods are research methods used to research, design, produce and test the validity of the products that have been produced. This study aims to develop Project Based Learning (PjBL) E-LKPD Assisted by Liveworksheet Applications on Class X Statistics Material at SMAN X in Padang which are valid and practical.

This learning media development model was developed using the Plomp model. The development model that will be applied refers to development (Plumps, 2013). The plomp development design has three stages or phases, namely (1) preliminary research, (2) prototyping stage and (3) assessment stage. In the preliminary analysis stage, among others used are needs analysis sheets, curriculum, students, observation sheets and interview guidelines. Then at the design stage, self-evaluation, expert review, one-on-one evaluation, and small group evaluation are carried out. In this study two stages were carried out, namely the preliminary stage and the design stage for the assessment stage carried out in further research. The research instruments used were product validity sheets, practicality questionnaires, and interview guidelines. Data analysis techniques in the development of this E-LKPD are qualitative and quantitative. Qualitative data were obtained from criticism and suggestions by the validator while quantitative data were obtained from questionnaires given to experts, teachers and students. First, data analysis at the preliminary analysis stage used descriptive techniques in the form of data from needs analysis, curriculum, and concepts as well as data from interviews. Second analysis of validity data. The results of the Liveworksheet based E-LKPD validity analysis. Based on the validation sheet, several steps are taken: The results of the Liveworksheet based E-LKPD validity analysis. Based on the validation sheet, several steps are taken: The results of the Liveworksheet based E-LKPD validity analysis.

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Result and Discussions

Preliminary Research Stage (Initial Investigation)

Curriculum Analysis Results

The curriculum used is appropriate but still in the adjustment stage.

Results of Analysis of Student Characteristics

Students do not like the books used by the teacher because there is too much writing and not enough pictures, students also do not like the activities carried out in learning, such as taking lots of notes, students are more dominant in liking practice.

Print Book Analysis Results

The package book presented is complete and systematic. The material presented is in accordance with the competencies that students must achieve, but students are less interested in learning to use textbooks because the language used in textbooks is too standard and contains a lot of writing and few pictures.

Needs Analysis Results

Students need teaching materials that are able to attract the attention of students so that they are interested in learning such as the use of E-LKPD by utilizing electronics which almost every student already has so that it can support students' learning interest.

Data Prototyping Phase (Prototyping Stage)

Validity

Data from validator assessment results are described and analyzed qualitatively and quantitatively. The results of the E-LKPD validation sheet use live worksheets for mathematicians and technology experts. The percentage obtained from the results of the validation sheet can be seen in Table 1 below.

Table 1. Validation Results

Validators	Final score	Category
Mathematician	90%	Very Valid
Tech Expert	94%	Very Valid
Average Percentage	92%	Very Valid

Based on Table 1, a percentage of 92% is obtained with a very valid category by mathematicians and technology experts, so the E-LKPD is valid for use by students and teachers. Following are some suggestions from mathematicians and technology experts for improving E-LKPD.

In the user manual there is an error in writing. The writer corrected the error by tidying up the writing, changing unnecessary vocabulary and emphasizing the writing intended for activity instructions. Presentation before and after revision can be seen in Figure 1.

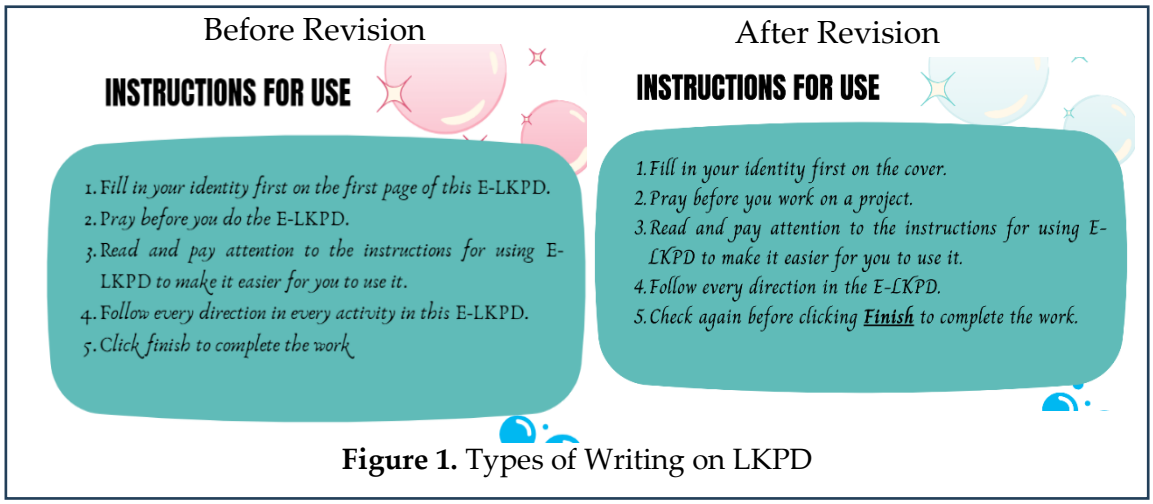

Figure 1. Types of Writing on LKPD

The use of writing models that are less consistent in the use of LKPD. The author corrected the error. Presentation before and after revision can be seen in Figure 2.

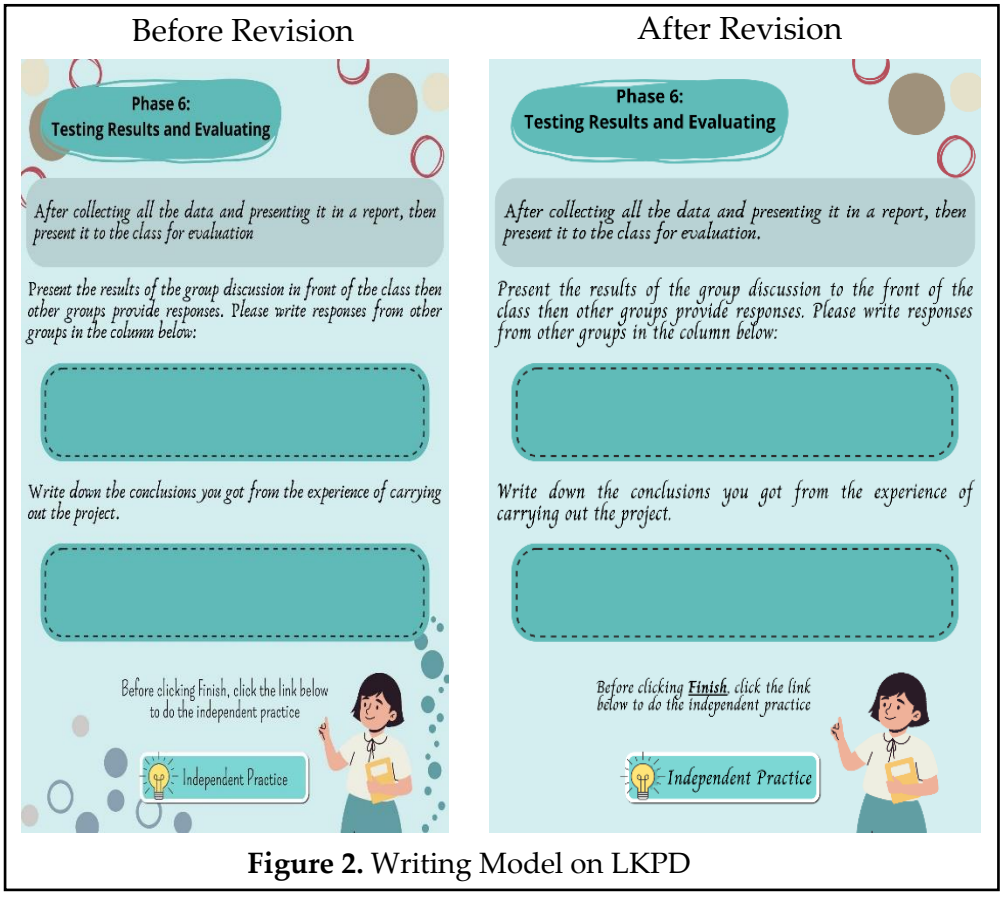

Figure 2. Writing Model on LKPD

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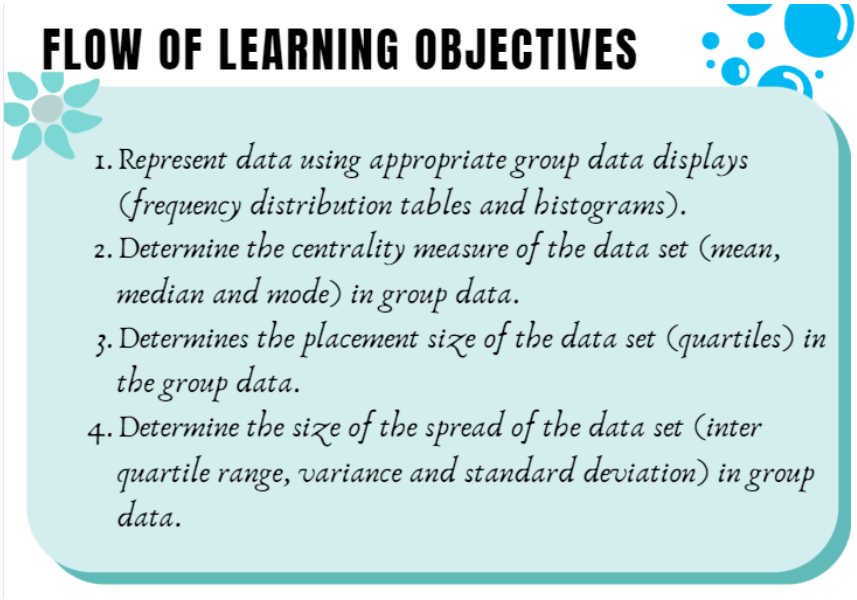
In the Learning Objectives Flow there is an error where it is presented for all meetings. The author corrects this mistake by explaining the Flow of Learning Objectives that are in accordance with what is learned in the meeting worksheets. Presentation before and after revision can be seen in Figure 3.

Before Revision



After Revision

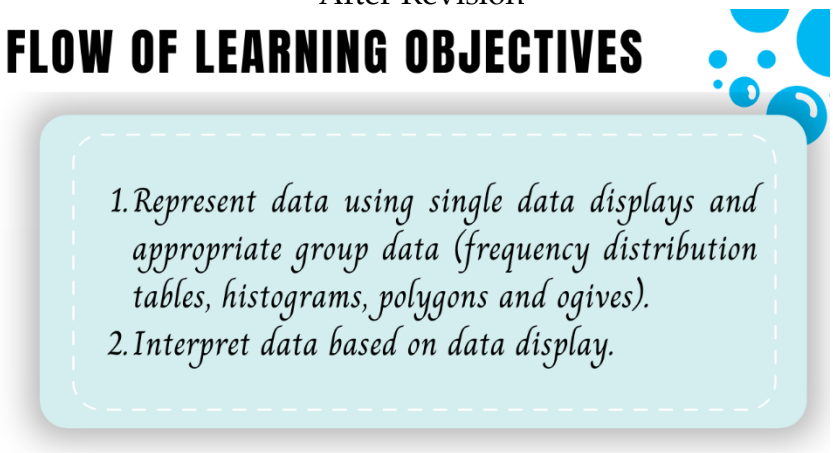


Figure 3. Form the Flow of Learning Objectives

In phase two, namely the basic questions that present diagrams, there is no explanation of the data used. Presentation before and after the revision can be seen in Figure 4.

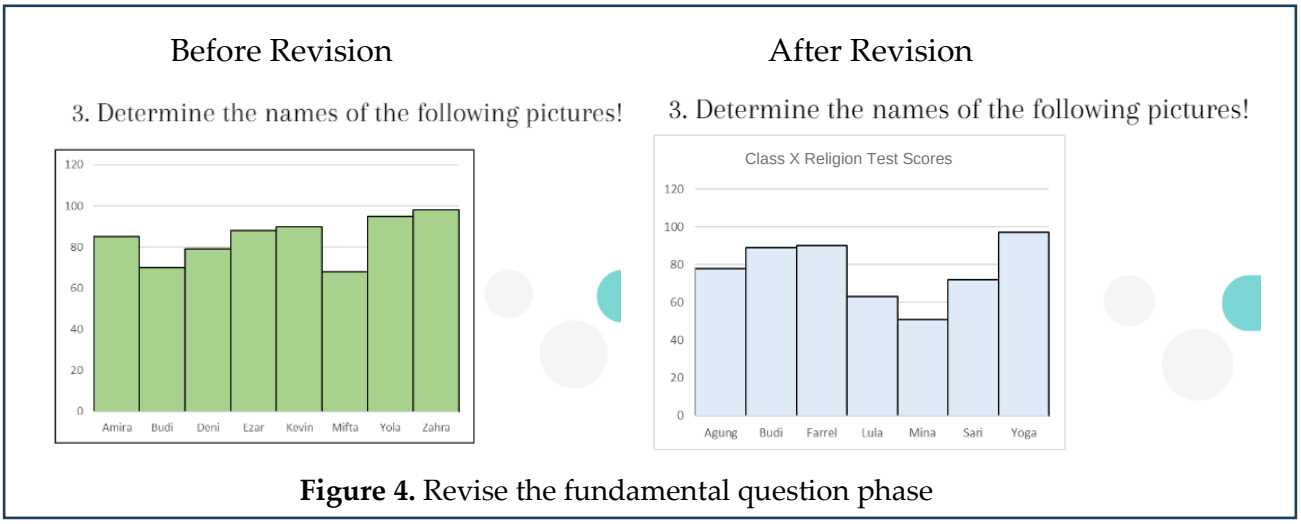


Figure 4. Revise the fundamental question phase

The font type used for the E-LKPD answers is too small and the colors used are not attractive, the validator suggests improving the font type to make it more attractive and the font size adjusts to the E-LKPD. Presentation before and after revision can be seen in Figure 5.

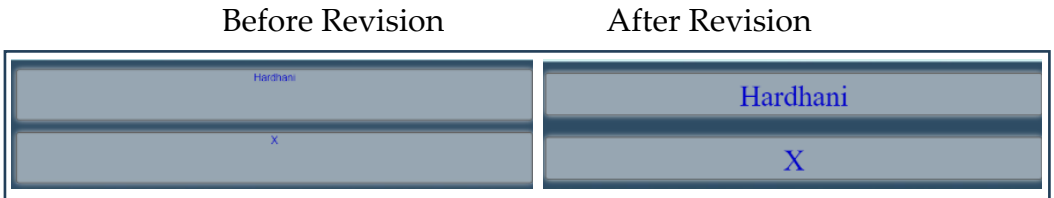


Figure 5. Revision of Fields

In the fifth phase of monitoring, the validator suggests that the elements of the boxes that interfere make students hesitate to fill in answers on the E-LKPD are removed. Presentation before and after revision can be seen in Figure 6.

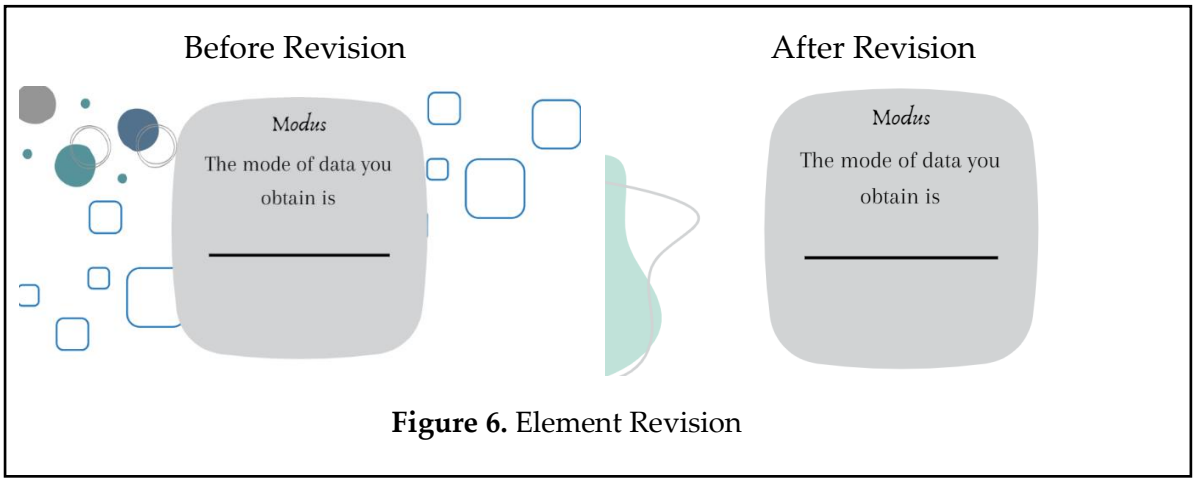


Figure 6. Element Revision

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Practicality

At the practicality stage, 2 tests were carried out, namely one-on-one and small group tests. The results of one-on-one evaluations for mathematics teachers, one-on-one evaluations of students and small group evaluations can be seen in Table 2 below.

Table 2. Practical results

Practitioner	Final score	Category
Teacher One-On-One Test	96%	Very Practical
One-on-One Student Test	92%	Very Practical
Small Group Test	88%	Very Practical
Average Percentage	92%	Very Practical

Based on Table 2, a final score of 92% is obtained in the very practical category. This shows that the E-LKPD uses a liveworksheet application with Statistics material which is very practical for use in learning mathematics at SMAN X in Padang. Following are some of the improvements obtained from the one-to-one test and small group test for the development of E-LKPD.

In the Monitoring Phase, in the search for a single data median, there was an error in using the formula. The Revision form can be seen in Figure 7.

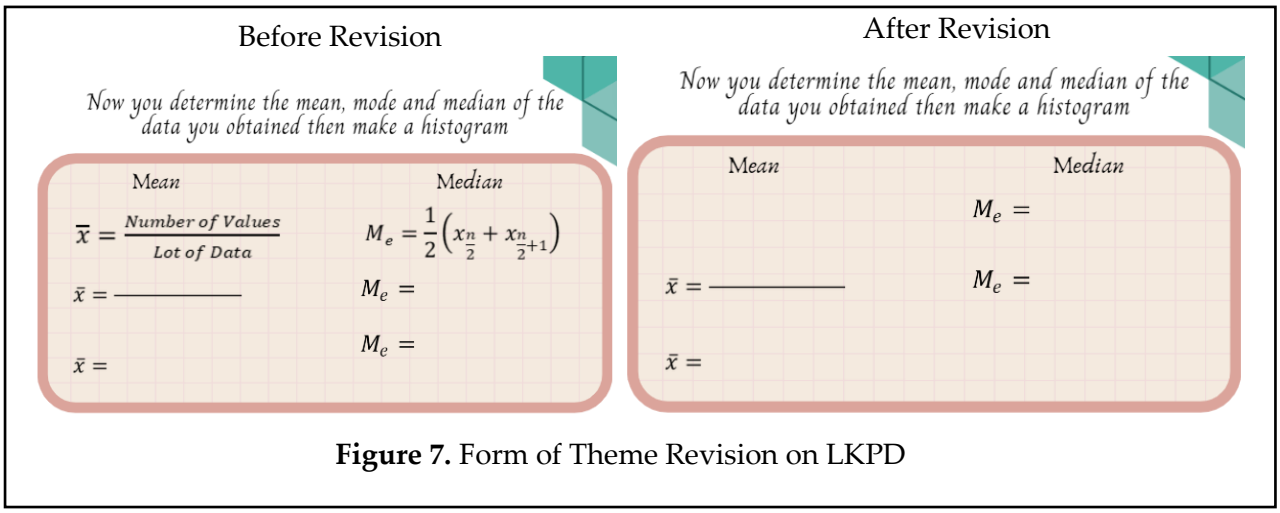

Figure 7. Form of Theme Revision on LKPD

During the Monitoring Phase in the median group data section, the size of the filling box is too small so the numbers you want to enter don't fit. The author made improvements by increasing the size of the filling box. The revised form can be seen in Figure 8.

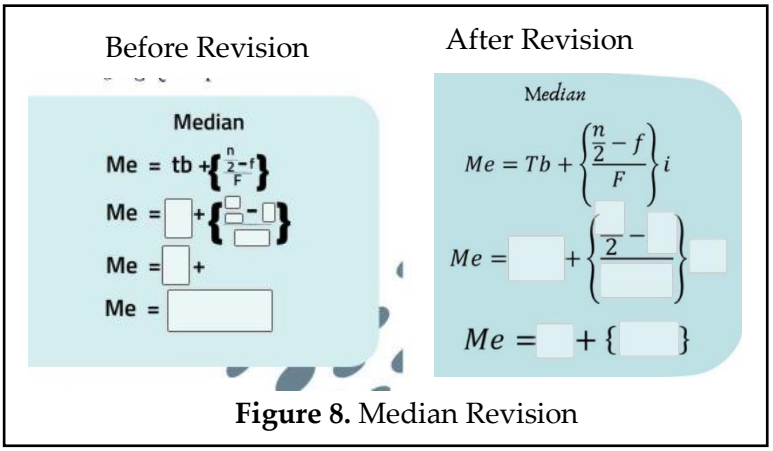

Figure 8. Median Revision

In Phase 1 Observing the Phenomenon the size of the video box is too small so that students have difficulty reading the text contained in the video. The author made improvements bjy increasing the size of the video box. The revised form can be seen in Figure 9 below:

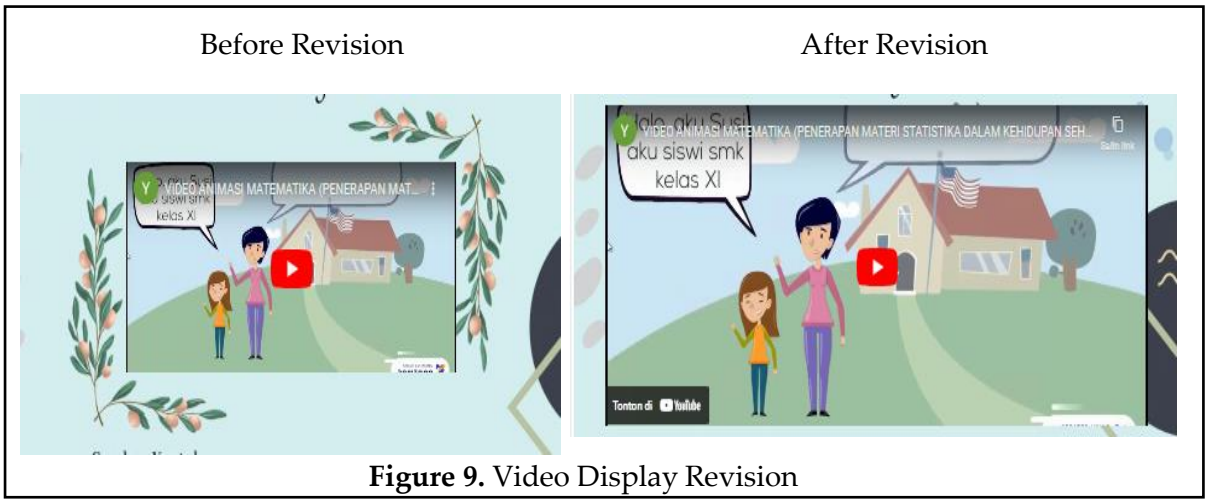

Figure 9. Video Display Revision

Conclusion

Based on the research and data analysis that has been done, it can be concluded that the E-LKPD assisted by the liveworksheet application on statistical material by the mathematician validator obtained a percentage of 90% in the very valid category, then the technology expert validator obtained a percentage of 94% in the very valid category. As for the practicality of using the E-LKPD, the teacher obtained a percentage of 96% in the very practical category. For the results of the one-on-one test students obtained a percentage of 92% with a very practical category. For the small group test results obtained a percentage of 88% with a very practical category. Based on the

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percentages above, this proves that the E-LKPD using the liveworksheets application on statistical material is valid and practical to use.

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References

Andriyani, N., Hanafi, Y., Safitri, I. Y. B., & Hartini, S. (2020). Penerapan Model Problem Based Learning Berbantuan LKPD Live Worksheet Untuk Meningkatkan Keaktifan Mental Siswa Pada Pembelajaran Tematik Kelas VA. *Prosiding Pendidikan Profesi Guru, September*, 122-130.

Anisah, H., Ramadoni, R., & Hamid, A. (2023). Pengaruh Model Pembelajaran Problem Posing Pada Materi Aritmatika Sosial Terhadap Hasil Belajar Siswa. *THEOREMA: The Journal Education of Mathematics, 4(1)*, 1-8. https://doi.org/10.36232/theorema.v4i1.3924

Arisanty, Hastuti, Setiawan, dan I. (2020). Improving Geography Learning through Project-based Learning Model. *International Journal of Psychosocial Rehabilitation, 24(5)*, 585–594. https://doi.org/10.37200/ijpr/v24i5/pr201723

Astuti, W. D. (2016). Pengembangan Bahan Ajar Dengan Pendekatan Project Based Learning Pada Materi Program Linear Untuk Siswa Kelas X SMK. Revista CENIC. *Ciencias Biológicas, 152(3)*, 28. https://doi.org/https://doi.org/10.21831/jpm.v5i8.4603

Fajri, E. D. R. (2019). *Pengembangan Media Pembelajaran Interaktif Menggunakan Google Classroom Berbantuan Software Geogebra Pada Materi Fungsi Kuadrat*. Skripsi.

Hardiyanti, P. C., Wardani, S., & Kurniawan, C. (2020). Efforts to Increase Mathematical Logical Intelligence Through Development of Student Worksheets Based on Problem Based Learning. *Journal of Innovative Science Education, 9(3)*, 335–341. https://doi.org/10.15294/jise.v9i1.36846

Hasim, E. (2020). Penerapan kurikulum merdeka belajar perguruan tinggi di masa pandemi covid-19. *E-Prosiding Pascasarjana Universitas Negeri Gorontalo*, 68–74. https://ejurnal.pps.ung.ac.id/index.php/PSI/article/view/403/364

Nasution, L. M. (2021). Dasar Statistika. *Al-Fikru: Jurnal Ilmiah, 13(2)*, 141–145. http://jurnal.staiserdanglubukpakam.ac.id/index.php/alfikru/article/view/18. https://doi.org/10.51672/alfikru.v13i2.18

Plomp, T., & Nieveen, N. (2013). *Educational Design Research* (T. Plomp & N. Nieveen (Eds.)). Enschede. https://s2pnd-matematika.fkip.unpatti.ac.id/wp-content/uploads/2022/10/educational-design-research-part-a.pdf#page=154

Prastowo, A. (2014). Pemenuhan kebutuhan psikologis peserta didik SD/MI melalui pembelajaran tematik-terpadu. *Jurnal Pendidikan Sekolah Dasar Ahmad Dahlan, 1(1)*, 1-13. https://doi.org/10.26555/jpsd.v1i1.a538

Putri, D. H., Yunita, A., & Mardiyah, A. (2022). Pengembangan Lembar Kerja Peserta Didik Berbasis Pendekatan Saintifik pada Materi Matriks. *Lattice Journal: Journal of Mathematics Education and Applied, 2(1)*, 64. https://doi.org/10.30983/lattice.v2i1.5422

Rahayu, R., Rosita, R., Rahayuningsih, Y. S., Hernawan, A. H., & Prihantini. (2021). Implementasi Kurikulum Merdeka Belajar di Sekolah Penggerak Restu. *Jurnal Basicedu, 5(4)*, 2199–2208. https://doi.org/https://doi.org/10.31004/basicedu.v6i4.3237

Ramadoni & Boas. (2023). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Dalam Menyelesaikan Soal Materi Lingkaran Kelas VIII Smpn 29 Padang. *Journal of Basic Education Studies 6(1)*, 311–320. https://mail.ejurnalunsam.id/index.php/jbes/article/view/8044/4109

Riduwan. (2010). *Skala Pengukuran Variabel-variabel Penelitian*. Alfabeta.

Risal, Z., Hakim, R., & Rosid, A. A. (2022). *Metode Penelitian dan Pengembangan Research and Development* (Rnd) (M. S. Sofia Yustiyani Suryandari, S.E. (Ed.)). Alfabeta. https://elib.sanagustin.ac.id/index.php?p=show_detail&id=3167&keywords=

Sari, D. N., Haryono, Y., & Ramadoni. (2022). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matematika Kelas Viii Di Smp N 2 Luhak Nan Duo Kabupaten Pasaman Barat. *Jurnal Lemma, 9(1)*, 27–37. https://doi.org/10.22202/jl.2022.v9i1.5644

Sari, R. T., & Angreni, S. (2018). Penerapan Model Pembelajaran Project Based Learning (PjBL) Upaya Peningkatan Kreativitas Mahasiswa. *Jurnal VARIDIKA, 30(1)*, 79–83. https://doi.org/10.23917/varidika.v30i1.6548

Spooner, K., Nomani, J., & Cook, S. (2024). Improving high school students' perceptions of mathematics through a mathematical modelling course. *Teaching Mathematics and Its Applications, 43(1)*, 38–50. https://doi.org/10.1093/teamat/hrad001

Tussholeha, Z., Rezeki, S., & Suripah, S. (2023). Student Worksheets (LKPD) With Problem Based Learning (PBL) Model on Social Arithmetic Materials in Class VII SMP/MTs. *AlphaMath: Journal of Mathematics Education, 9(1)*, 88-97. https://doi.org/10.30595/alphamath.v9i1.15159

Wulandari, S. P., & Suryowati, E. (2023). The Effectiveness of the Use of The Result Determining-Lamp Media in Class IV Students at SDN Senden Peterongan. *AlphaMath: Journal of Mathematics Education, 9(1)*, 52. https://doi.org/10.30595/alphamath.v9i1.17100