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Development of Liveworksheet-based Interactive LKPD on The Local Biodiversity "Kratom" to Support the P5 Project

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Abstract: This research aims to develop valid and practical Liveworksheet-based interactive LKPD on the local biodiversity "Kratom" to support the P5 Project. This research method used research and development (R&D) with the 4D model consisting of 4 stages: Define, Design, Develop, and Disseminate. The developmental research was conducted at SMAN 3 Pontianak, with teachers and students in class X as the research subjects. The research instrument used an interview and a questionnaire with a Likert scale validity data analysis and a Guttman scale for practicality data analysis, which analyzed descriptively qualitative and quantitative. The results showed that the interactive E-LKPD developed a very valid category based on the validator's assessment of the material experts, with an average of 94.2%, media experts 96.3%, and linguistics 91.9%. Based on various factors such as appearance, presentation of materials, usefulness, and response to project-based learning activities. The results of the practicality of the student questionnaire response were 90% in the small-scale trial and 88.4% in the large-scale trial. So, the developed Liveworksheet-based interactive LKPD is categorized as very practical. Based on these findings, the development is categorized as very valid, very practical, and can be utilized in learning biology on biodiversity material to support P5 project.

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Introduction

Since 2022, the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia (Kemendikbudristek RI) has implemented the issuance of a Merdeka curriculum based on Kepmendikbudristek No. 56 of 2022 concerning Guidelines for Implementing the Learning Recovery Frame Curriculum, which is the legal basis for implementing the Merdeka curriculum (Martati, 2022). The main difference that distinguishes the Merdeka curriculum from the previous curriculum is the Pancasila Student Profile Strengthening Project called the P5 project (Setyani et al., 2023). So, the project-based learning model is one of the learning models that can facilitate the implementation of the Merdeka curriculum (Sadia & Retnasari, 2023; Mujiburrahman et al., 2022). Project-Based Learning is an innovative learning model that emphasizes student-centered learning and places the teacher as a motivator and facilitator (Alhayat et al., 2023). According to Kortam et al., (2018) Project-Based Learning can motivate students and have more positive attitudes towards studying biology. Learning activities based on the project-based learning model are generally applied with teaching materials in student worksheets (LKPD). Student Worksheet (LKPD) is one of the learning resources that can be developed by educators as facilitators in learning activities (Irawan, 2016).

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SMAN 3 Pontianak is one of the schools in Pontianak City that pioneered the implementation of the Merdeka curriculum. Based on interviews that the author has conducted with biology teachers at SMAN 3 Pontianak, the teaching materials used at the school are textbooks that are distributed on a limited basis; 1 book is used by two students. The use of Student Worksheets (LKPD) is presented on sheets of paper printed. According to Herawati et al., (2016), printed worksheets are less effective in appearance, content, and practicality. Based on these problems, the thing that teachers can do is teach materials development. Teachers need innovative teaching material that all students can access, one of which is innovative LKPD packaged in online form to create an interactive LKPD.

Interactive LKPD can be accessed easily using electronic devices such as computers, laptops, and smartphones (Ratnawati, 2021). The use of interactive LKPD in learning activities is a tool for teachers to provide knowledge, attitudes, and skills to students to create interactive and fun learning (Alfarizi et al., 2024). According to Puspita & Dewi (2021), the use of E-LKPD in the teaching and learning process can have an impact on students' learning activities, which are initially boring to be fun and exciting, make it more interactive, and students can become more motivated to be more enthusiastic in learning.

Interactive LKPD (E-LKPD) can be developed using one of the Learning Management System (LMS) softwares, namely Liveworksheet (Widiyarsih et al., 2023). Liveworkseets can turn conventional LKPD (documents or pdf files) into more interesting LKPD by combining text, images, videos, animations, power points, links, and audio that are done online (Rahayu et al., 2024). Previous research findings state that the use of liveworksheet interactive E-LKPD can increase student activeness and learning outcomes (Ningsih et al., 2023), facilitate the teacher when delivering learning materials, increase student learning independence (Suryandari et al., 2023) and provide convenience in learning (Prastika & Masniladevi, 2021). E-LKPD in the form of a liveworksheet can increase students' motivation because it presents an image display with an attractive color combination and easy access, only requiring a stable internet network in the process (Tiara et al., 2023).

Based on research results PKM-RE from authors kratom leaves can be formulated in the manufacture of solid soap that has met the requirements of the organoleptical test, pH test, foam stability test, and irritation test. In Indonesia, Kratom [*Mitragyna speciosa* (Korth.) Havil.] is a local biodiversity from the Kapuas Hulu area, West Kalimantan. According to Ramadhani et al., (2024) Local biodiversity has the potential to be utilized as a source of project-based learning for students in internalizing character values in strengthening the student profile of Pancasila. Learning through local potential is a learning tool that can encourage students to make connections between the knowledge gained and the application in real life, so that learning outcomes are expected to be more meaningful to students.

Liveworksheet-based interactive LKPD was developed in class X biology material on biodiversity. In the teaching module for biodiversity phase E of the independent curriculum, one of the learning outcomes (CP) is that students can create solutions to problems based on local, national or global issues related to understanding the diversity of living things and their role (Rizki et al., 2023). To achieve this CP through the utilization of biodiversity, one of the projects that students can do is making solid soap from kratom leaves. The projects given can be directly applied in everyday life which is suitable for enhancing students' creativity. However, in this study, the project of making kratom leaf soap does not use extracts but uses powder to minimize time and cost.

Several studies that have been conducted previously reveal that the use of project-based learning models makes students more active and creative and can improve student learning outcomes (Susiana & Renda, 2021; Khoiruddin, 2021). Furthermore, another study

states that interactive LKPD liveworksheets based on project-based learning can improve students' thinking skills and make it easier for students to understand the material (Azizah et al., 2023; Ghefira et al., 2023). In addition, the Liveworksheet-based interactive LKPD provides convenience for teachers, increases the motivation of students, and is effectively used in learning biology in high school (Tiara et al., 2023; Arifin et al., 2023).

Based on the findings of several studies, it can be concluded that the use of Liveworksheet-based interactive LKPD and project-based learning models in the learning process can have a positive impact on teachers and students. It's just that in previous studies there have been no studies that discuss the development of liveworksheet-based interactive LKPD on the local biodiversity kratom to support the P5 project. So this research is focused on these studies, with the aim of this research is to analyze the validity and practicality of the liveworksheet-based interactive LKPD developed to be used in biology learning to support the P5 project.

Research Method

This study used the Research and Development method. The model used in this research is the 4D model, which has 4 main stages, namely define, design, develop, and disseminate (Thiagarajan et al., 1974). The developmental research was conducted at SMA Negeri 3 Pontianak, with teachers and students in class X as the research subjects. The research sample was students of class X-E SMAN 3 Pontianak totaling 40 students for trial to assess practicality. The sample selected in this study used the purposive sampling technique, which was selected directly by the biology teacher with consideration of classes that had heterogeneous students. Purposive sampling is a sampling technique with certain considerations (Sugiyono, 2020). The trial was conducted with details of 10 students for small-scale trials and 30 students for large-scale tests.

This study's instruments include material expert validity sheets, media expert validity sheets, and linguistic expert validity sheets, as well as student response questionnaires to assess practicality and interviews. The data obtained from this research were as follows: a) validation results from material experts, media experts, and linguistic experts, b) student response data practicality rate in the small-scale trial and large-scale trial. The data analysis techniques utilized were descriptively qualitative and quantitative data. In this study, qualitative data were obtained through the results of interviews with teachers and students, responses, and input from validators and students, which are used as a reference for revisions to the products developed. The quantitative analysis was done by processing data from expert validation and responses from students using percentages.

The validation questionnaire by choosing one of the four alternative answers of the Likert scale provided on each statement item in the questionnaire with a score range of 1 to 4, namely (1) very bad, (2) bad, (3) good, and (4) very good (Sugiyono, 2019). The results of this analysis were then used to revise the developed interactive E-LKPD. Meanwhile, to analyze the practicality questionnaire obtained from the student response questionnaire after using the product. The assessment used by researchers to determine the response of students using the Guttman Scale with a score of Yes = 1 and No = 0 (Irsalina & Kusumawati, 2018) The data collected was then summed up and averaged. The average score was then transformed into categories, as shown in Table 1.

Table 1. Categories Validity and Practicality

Percentage (%)	Criteria Validity	Practicality Criteria	Information
85,01-100	Very valid	Very Practical	Usable without revision
70,01-85,00	Valid	Practical	Usable but needs a bit of

			revision
50,01-70,00	Less Valid	Less Practical	Recommended not to be used because needs major revision
01,00-50,000	Invalid	Impractical	May not be used

Source : (Akbar,2017)

The Interactive E-LKPD are said to be valid and practical if the score obtained is more than 70% (Azizah et al., 2024).

Results and Discussion

This research has resulted in the Development of liveworksheet-based Interactive LKPD on the Local Biodiversity Kratom to Support P5 Project, using a 4D model. The result and explanation for each step provided below.

Define

The defining stage is the first stage in development research. This defining stage is carried out to find out and determine the needs in the learning process. In the defining stage, researchers carried out 5 activities, namely: front-end analysis, learner analysis, task analysis, concept analysis (material analysis), and specifying instructional objectives (Maydiantoro, 2021; Thiagarajan et al., 1974).

a) Front-end Analysis

During the front-end analysis stage, the analysis is carried out to identify and determine the basic problems encountered in the learning process so that it is the background for the need for development. Data for the analysis was gathered through the process of interviews with biology teachers. The results of interviews with teachers concluded that in the biology learning process, the teaching material used in the school is a textbook which was distributed on a limited basis and the teacher had problems in preparing learning media because each class had different learning characteristics so that the learning media used were only videos and PowerPoint slides. and the use of student worksheets (LKPD) is printed worksheets. Based on this problem, there is a need for innovative teaching materials. Therefore, the author wants to develop LKPD that can be accessed by all students and is easy to use by teachers, namely online LKPD that is attractively packaged through the Liveworksheet website where learning videos, images, and audio can be included, as well as varied practice questions. The limited use of teaching materials in the learning process is also one of the reasons for the importance of developing E-LKPD media in biology learning. E-LKPD was selected as a solution in light of the times where technology is starting to be utilized (Susiana & Renda, 2021)

b) Learner Analysis

Student analysis aims to find out the characteristics of students and difficulties experienced by students during the learning process (Harjanto et al., 2022). The characteristics in question relate to academic abilities and motivation in biology learning. Limitations textbooks distributed by schools make the results of students' daily test scores in biology subjects on biodiversity material very low. The Results of interviews with students obtained information that students will be motivated to take part in learning if the teaching materials used are interesting and students feel bored learning using textbooks.

c) Task Analysis

Task analysis is adjusted to the Merdeka curriculum, which includes learning outcomes (CP) and flow of learning objectives (ATP) in phase E (Qotrunada et al., 2023).

d) Concept Analysis (Material Analysis) Results

E-LKPD is developed with a project-based learning model that contains biodiversity material. The learning outcomes (CP) taken in phase E are that students can create solutions to problems based on local, national, or global issues related to understanding the diversity of living things and their role. The summary of the material is about the biodiversity of the kratom plant and how it is utilized which is equipped with pictures and learning videos. The kratom plant is an example of biodiversity at the gene level. Gene diversity is the diversity of individuals in one type or species of living things. Gene diversity causes variations in genetic makeup so it affects the genotype and phenotype. As in kratom plants, there are 3 variations in leaf bone color, namely red veins, green veins, and white veins. Previous research conducted by Suhaimi et al., (2019) stated that kratom leaf thick extract has an effect as an antibacterial, kratom leaf extract has activity of inhibiting the growth of Escherichia coli bacteria, and kratom leaf extract has been able to inhibit the growth of Propionibacterium acnes bacteria. Antibacterials in kratom leaves can be used as one of the formulas for making solid soap. The implementation of project-based learning in the developed E-LKPD lies in the project task of producing a product from the utilization of kratom leaves. The project-based learning (PjBL) syntax starts from 1) Start with the essential question, 2) Design a plan for the project, 3) Create a schedule, 4) Monitor the student and progress of the project, 5) Assess the outcome, and 6) Evaluate the experience (Setiyo Wibowo, 2014).

e) Specifying Instructional Objective.

The analyzing learning objectives aims to scrutinize the learning goals that students need to accomplish during their education. According to Salsabila et al.,(2023) the formulation of learning objectives must be based on learning outcomes and indicators of learning outcomes because the learning objectives made will be used as a reference in developing E-LKPD based PjBL. The main purpose of E-LKPD teaching materials is through the project-based learning model, which is to direct students to understand biodiversity material, design, and make products to solve contextual problems by working together in groups, being active in the learning process, reasoning critically and creatively, and being able to report the results of the use of kratom leaves by applying the scientific method.

Design

The second stage is the design stage, which includes media selection, format selection, and initial design (Maydiantoro, 2021). In media selection, researchers choose the media or teaching materials to be developed are Interactive E-LKPD Liveworksheet Based on Project Based Learning. The next stage is format selection, the layout of this E-LKPD is adjusted to ISO standards with a size of 21 x 29.7 cm using A4 paper. According to Triyani et al., (2024) the size can be customized and can be used on mobile phones or laptops. The fonts used are Times New Roman, Genty Sans, and Literata size 18-20.

The initial design was designed using the Canva application, because in it there are many animations and images that can be included (Tiara et al., 2023) , and then the features or elements using the liveworksheet. Learning videos are created using the CapCut application and uploaded to YouTube. The E-LKPD presentation consists of a cover component, learner identity, preface, table of contents, instructions for use, learning outcomes, learning objectives, an introduction containing biodiversity material packaged in learning videos, project-based learning syntax, columns provided for student answers reflection, glossary, bibliography, and also the author's profile (Salsabila et al., 2023). Features that are inserted as supporting This interactive LKPD is a Google Form. The following are some product displays of the Interactive LKPD developed can be seen in Figure 2 and Figure 3.

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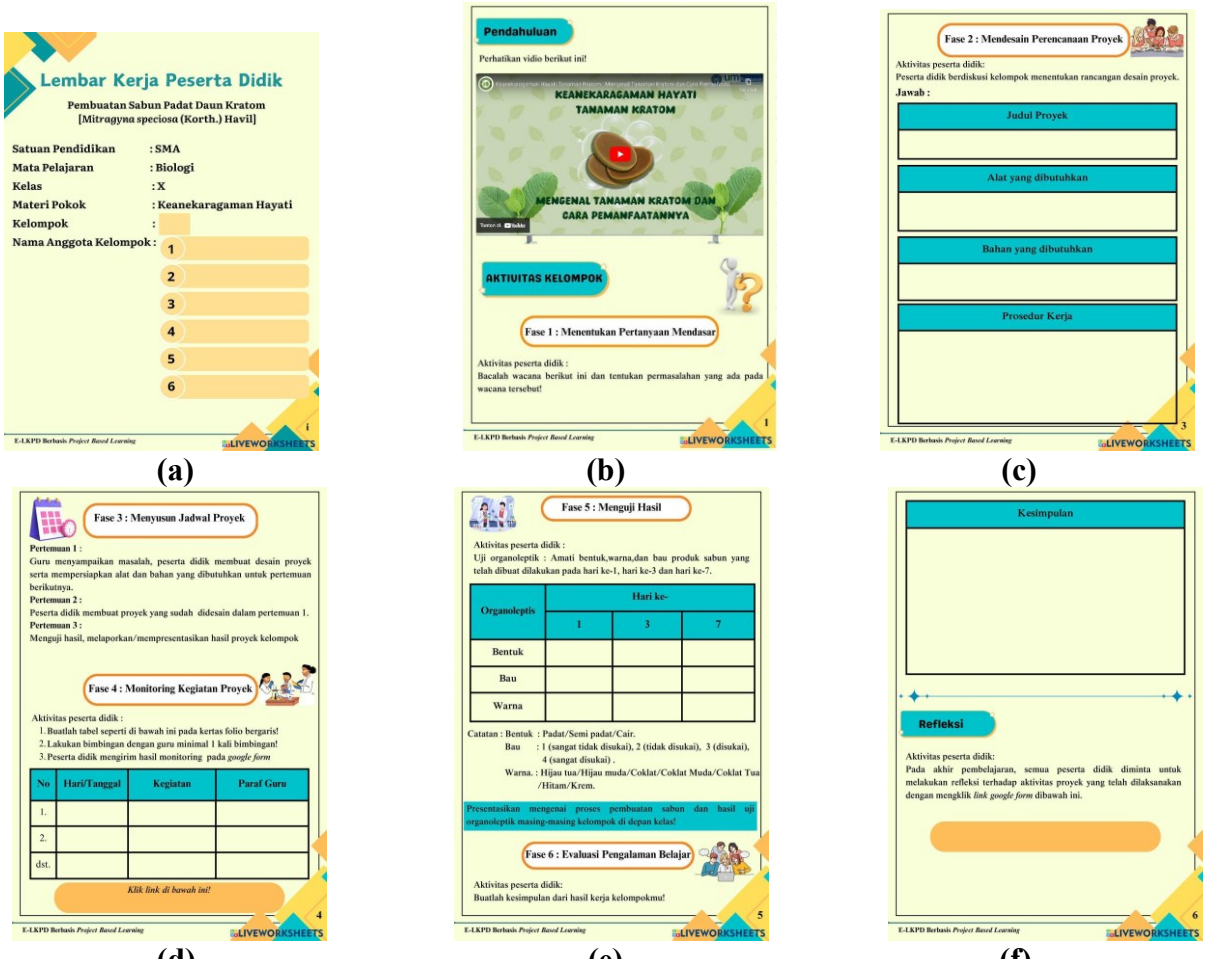
Figure 1.Cover the Liveworksheet-based interactive LKPD



(a) **(b)** **(c)**

(d) **(e)** **(f)**

Figure 2. (a) Learners' identity. (b) The introduction contains material on kratom biodiversity and how to use it packaged in videos and phase 1 project: start with the essential question, (c) phase 2: design a plan for the project (d) phase 3: create a schedule and phase 4: monitor the student and progress of the project, (e) phase 5: assess the outcome, (F) phase 6: evaluate the experience and learners' reflection

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Development

This stage includes expert validation and product revision. Expert validation is carried out to determine the feasibility of interactive LKPD products developed in three aspects, namely material validation, media validation, and language validation. Validators material experts, media experts, and linguists consist of 2 lecturers and 1 teacher (Febriyanti et al., 2023). The revisions and suggestions of the validators are used as a basis for improving and refining the interactive LKPD so that the product developed becomes a product that is feasible and according to the needs of students. After the developed product is revised according to expert advice and is suitable for field testing.

Table 3 summarizes the outcomes of validating the liveworksheet-based interactive LKPD.

Table 3. The material, media, and language validation results

Expert Validation	Average (%)	Information
Material	94.2	Very valid
Media	96.3	Very valid
Language	91.9	Very valid
Overall Result	94.13	Very Valid

Based on the validation results in Table 3, the material expert validation results obtained a percentage of 94.2%, which means that the liveworksheet-based interactive LKPD developed is classified as very valid with the assessment aspects including the presentation of material and presentation of LKPD content. Based on the validation value, it is concluded that the material presented is in accordance with the learning outcomes and learning objectives in the independent curriculum. LKPD is designed in accordance with the phases of project-based learning, which consists of 6 phases (Safenita et al., 2023) that are clear and easy to understand. The validation results are very valid for the accuracy of the material content, the accuracy of concepts and definitions, the accuracy of work procedures, and the accuracy of references. Based on the values that have been obtained, it is supported by the research of (Qotrunada et al., 2023) that student worksheets already have learning outcomes and are arranged in accordance with the learning objectives to be achieved. Project-based learning activities are presented systematically, clearly, and easily understood. The colors used in student worksheets are attractive so that they attract students' reading interest.

The results of the media expert validator assessment obtained an average of 96,3% classified as very valid criteria with assessment aspects including appearance design, readability, user-friendliness, and user interest. In line with research conducted by N.F. et al., (2022), who obtained the results of validation of liveworksheet-based interactive LKPD of 90% with a very valid category. Media validation aims to determine the quality and effectiveness of the products that have been developed (Widiyani & Pramudiani, 2021). In general, based on the assessment of media experts, it can be concluded that the Interactive E-LKPD Liveworksheet on the Kratom Soap Project developed is very good and can be used without revision.

In terms of linguistic aspects, the liveworksheet-based interactive LKPD developed is classified as very valid, with an average linguist validation result of 91.9%. The suggestions and input from the linguist validator on interactive LKPD are that the validator suggests the use of language adapted to EYD and KBBI and correcting sentence writing errors (typo). The suggestions were then followed up to make it easier for students to read the interactive LKPD. Based on the linguist validation score, this shows that the products developed have used language that is straightforward, communicative, interactive, clear, and in accordance with Indonesian language rules, and the language used is in accordance with the intellectual development of students. In line with the research of Rahmawati et al., (2016), the language

used in learning media must pay attention to several aspects, namely communicative aspects, dialogical and interactive aspects, and conformity with correct Indonesian language rules such as the use of spelling, punctuation, terms, and sentence structure, so that it can foster learning motivation and is easily understood by students. From the three aspects, an average assessment of 94.13% was obtained so that the Liveworksheet-based interactive LKPD was included in the criteria as very valid or feasible to use with minor revisions.

Disseminate

The dissemination stage is carried out on a limited basis (Andarwati & Eva, 2024) by distributing liveworksheet-based interactive LKPD to analyze practicality through student responses on small-scale trials and large-scale trials. Students were given a learner response questionnaire by the researcher to assess how the learners responded to the practicality of the product that had been developed. The results of the small-scale trials and large-scale trials are shown in table 4 below.

Table 4. Recapitulation of the results of the small-scale trials and large-scale trials

Aspects	Results of Small-Scale Trials (%)	Results of Large-Scale Trials (%)	Criteria
Appearance	97.5	92.5	Very practical
Presentation of materials	87.5	86,7	Very practical
Usefulness	85	86.7	Very practical
PjBL Activities	90	87,7	Very practical
Overall Result	90	88.4	Very practical

Based on Table 4, the results show the practicality of the Liveworksheet-based interactive LKPD. In the small-scale trial, a percentage of 90% was obtained, while the large-scale trial yielded a percentage of 88.4%, both meeting very practical criteria. Practicality was assessed on aspects such as appearance, material presentation, usefulness, and response to project-based learning activities. Based on the questionnaire completed by students, it can be concluded that the Liveworksheet-based interactive LKPD has an attractive appearance, which motivates students in biology lessons. This is consistent with research by Azizah et al. (2024), which found that electronic teaching materials can motivate students to learn independently due to their appealing color choices and design. Additionally, research by Lasmiyati and Harta (2014) indicates that interesting and easy-to-understand teaching materials can enhance student motivation. Students responded positively to the development, showing enthusiasm for the new teaching materials and knowledge. Damayanti et al. (2023) support this, noting that the practicality value reflects a positive response. Therefore, the developed Liveworksheet-based interactive LKPD is highly feasible and practical for use in biology learning at SMAN 3 Pontianak.

Conclusion

Based on the results of the research and discussion, it can be concluded that the Liveworksheet-based interactive LKPD developed a very valid category based on the validator's assessment of the material experts, with an average of 94.2%, media experts 96.3%, and linguistics 91.9%. Based on various factors such as appearance, presentation of materials, usefulness, and response to project-based learning activities. The results of the practicality of the student questionnaire response were 90% in the small-scale trial and 88.4% in the large-scale trial. So, the developed Liveworksheet-based interactive LKPD is categorized as very practical. Based on these findings, the development is categorized as very

valid, very practical, and can be utilized in learning biology on biodiversity material to support the P5 project.

Recommendation

Based on the research results, It is recommended for teachers, the developed product is expected to be used as a reference for teaching materials in biology subjects and a reference to the P5 project. The following is the link to the E-LKPD that was developed: https://www.liveworksheets.com/w/id/biologi-sma-kelas-x/7780045. Research further suggestions can analyze the effectiveness of the product in the learning process in the classroom, and expected to develop Liveworksheet-based interactive LKPD in other subjects as well.

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