International Journal of Education and Teaching Zone. Volume 3 (Issue 3): 01-10 (2024)
DOI: https://10.57092/ijetz.v3i3.310

THE JOURNAL OF IJETZ
(International Journal of Education and Teaching Zone)
P-ISSN: 2963-7899 I E-ISSN: 2830-7925
jurnal.yayasannurulyakin.sch.id/index.php/ijetz

Designing Student Worksheets Based on Local Wisdom Using a Detailed Learning Model Integrated Discovery Learning on Biodiversity Material

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Article History:
Received: August 15, 2024
Revised: September 14, 2024
Accepted: September 22, 2024
Published: October 01, 2024

Keywords:
Biodiversity,
Discovery Learning,
Local Wisdom,
Student Worksheets.

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Abstract: The research that has been carried out is intended to produce student worksheets, which in Indonesian are abbreviated as LKPD. for Biology Learning based on Kerinci local wisdom, which is integrated with the Discovery Learning model on biodiversity material. This research is development research using the 4D model. The subject of this research is the class used in class X SMAN 2 Kerinci which consists of small group trials (9 people) and product trials (33 people). The data collection instrument in this research was a questionnaire where, at the development stage, the student worksheets were validated by material experts and design experts and assessed through responses from biology subject teachers. The data analysis technique used in this research uses a Likert scale. The research results show that material expert validation, with a percentage of 88.33%, is in the very good category. Furthermore, the design validation results are with a percentage of 98.33% in the very good category. The research results also showed that biology teachers responded to the developed student worksheets with a percentage of 87.50% in the "very good" category. The results of the small group trial of students were 76.62% in the "good" category, while the results of the large group trial were 80.37% in the "very good" category. Based on the results of validation and field trials, the LKPD based on Kerinci local wisdom, which is integrated with the Discovery Learning learning model on biodiversity material, is good and suitable for application in biology learning, especially on biodiversity material.

INTRODUCTION

Science is an inseparable part of alleviating poverty, solving ignorance and the nation's problems, and is the process of enabling humans to learn and understand the processes of life, and all of this requires a good and quality learning system (Eleknaviciute, Lehtinen, & Sodervik, 2023; Smith, Purcell, & Vaughan, 2015). Therefore, changes and developments in education should occur in line with the development of an increasingly advanced era (Cabrera & Pentang, 2023). The practice of changing and developing education is done by developing an education system and culture that is able to innovate and support the improvement of the quality of education in a better direction.

The education process requires a clear pattern, where educators must study, review, and revise the entire education system's education administration and a set of things needed in the education process (Meriani & Sari, 2022; Turan, 2014). For example, improvements are required in learning media, such as improving LKPD. Improvements or revisions can be done differently than science and technology or digitalization systems; they can also use regional advantages such as local culture or local wisdom that already exists in the local community explained that local wisdom-based LKPD would introduce students to local culture (Gugu & Dal Molin, 2016; Zhang & Zhang, 2018). Local knowledge in an area will present an angle with high value. At the same time, culture is a habit that has been around for generations, and everything can be used as a learning tool, especially biological learning (Arifin, Juharyanto, Mustingsih, & Taufiq, 2018; Fisher, Oldenburg, Boothroyd, Chan, & Finn, 2010; Wolfe-Hayes, 2010). Implementing learning through local wisdom will impact students who will more easily understand the material through observation, and the existing culture will become an analytical tool that can attract students to understand the biology learning that will be obtained in their regions, which they are familiar with (Sezen & B, 2012; Yuliani, Dharmono, Naparin, & Zaini, 2018).

Local wisdom-based learning is in accordance with the objectives of education in preserving the archipelago's culture to its heirs from an early age. Explains that local wisdom can also be interpreted as knowledge and strategies of community life in answering a problem in life (Kamal & Anwar, 2021; Zarkasyi, 2021). Local wisdom is the personality identity of a country, which is absorbed by that country even from its original culture. In the biology learning process, of course there will be several parts that are separated to carry out the learning process because the form of local wisdom can be in the form of values, norms, ethics, beliefs, customs and customary law (Craig & Allen, 2015; Lodico, 2010; Mahmoodi, Sadeghi, & Omidi, 2017; Zou & Yu, 2022), so the learning process must be paid attention to by adapting to the culture in the student's environment so that learning does not conflict with the paradigm of society in general, even though scientifically this usually happens provided that the process of providing information is carried out with data and from correct information. In addition, students have not realized the importance of protecting the environment and preserving biodiversity (Cummings, 1974). So far the teacher has also never integrated local wisdom in the biology learning process. To solve the above problems, the solution is to integrate Kerinci local wisdom in biodiversity material.

The process of integrating learning to make it interesting is a must, such as linking Kerinci local wisdom which is included as biology learning material to biodiversity material. Biology learning is integrated with local content such as the Sko kenduri ceremony which in several areas in Kerinci has different names, because of the cultural diversity, especially language, in Kerinci district (Nugraha et al., 2021; Noviyanti et al., 2022). Kenduri sko or kenduri padi is a traditsion that is always held continuously or passed down from generation to generation every year after the rice harvest in the Kerinci rice fields. This ceremony is held as an expression of gratitude for the harvest that has been obtained. Then the local wisdom of mandi balimau (Afriyanti, 2023). Balimau bathing (Mandi Balimau) in the Kenduri Sko event is a tradition of bathing with the Tigo Luhah

Semurup community which is carried out on the river bank guided by Ninik Mamak from the pavilion to sprinkle lime water on all the residents in turn. Furthermore, local wisdom that is integrated into biodiversity subjects is customary forest management. Traditional forests are part of the gift and trust given by God Almighty to the Indonesian people because they have many benefits for human life (Novianti et al., 2022). Kerinci local wisdom explains how to maintain and preserve biodiversity and ecosystems through customary forest management. Biodiversity is the unity of diversity of living things in terms of species diversity, genetic diversity and ecosystem diversity (Sari et al., 2020).

Students are part of society who should know the local wisdom that exists in the local area in order to preserve culture and instill cultural character in everyday life. Through learning local wisdom, students will easily understand the struggles of their ancestors in social activities such as the values of hard work, never giving up and (Sudarmin, 2014). An interesting learning process must of course be implemented in the biology learning process so that students can be more active in the learning process (Fisher et al., 2010; Kamal & Anwar, 2021; Suastra, 2010). Learning based on local wisdom is learning that can make you more effective and active in the learning process (Hana et al., 2021; Kritt, 2018). Utilizing local wisdom in the area can be used as a learning resource which so far not many have used in biology learning. Therefore, it is necessary to develop a student worksheet, abbreviated as LKPD in Indonesia, which is based on the Kerinci local wisdom integrated discovery learning model for class X students at SMAN 2 Kerinci to become a new learning breakthrough that can improve student learning outcomes.

METHODS

Application of the integrated Discovery Learning learning model, especially on biodiversity material. The subjects of this study were class X of SMA 2 Kerinci, consisting of small group tests (9 people) and product tests (33 people). This study is development research with a 4D model that includes the stages of definition, design, development, and dissemination (Creswell, 2012). The definition stage aims to define and determine the conditions. The objectives of the analysis need to be achieved, which begin with objectives that include front-end analysis, student analysis, task analysis, concept analysis, and formulation of learning objectives. The design stage is carried out to design a prototype of the LKPD that is developed. This stage includes the selection of product formats and product preparation. After this stage, the product is ready to proceed to the development stage. The development stage begins with the observation and interview stage in the field, selection of learning models, initial product design, product validation by validators followed by revisions (Cabrera & Pentang, 2023), limited trials followed by revisions, and field trials followed by revisions again to produce valid LKPD.

The types of data used are quantitative and qualitative data. Qualitative data includes suggestions from material experts, design experts, teacher responses, and student responses. Quantitative data in the form of scores from material experts, design experts, teacher responses, and student responses to the LKPD is being developed. The data collection instrument used was a closed questionnaire. This questionnaire is in the form of a material validation questionnaire, design validation, small group trials, and large group

trials. The questionnaire for assessing student, teacher, and lecturer responses has specific indicators to be used as guidelines or benchmarks in this study. These indicators can be seen in Tables 1, 2, 3, and 4. In the first stage, an analysis was carried out based on the results of expert validation, commonly called logistic validity. Then, the validation results will be carried out as in the analysis in Table 1.

Table 1. Criteria for Retrieval of LKPD Material Validation Results

Scale	Value Score	Validation Level
4	48,75 – 60,00	Very good
3	37,50 – 48,74	Good
2	26,25 – 37,49	Less Good
1	15,00 – 26,24	Not Good

Validation that has been carried out by experts, especially material experts, will be observed and analyzed according to the indicators in Table 1. This division is used as an effort to see how different and also accurate the instruments are in providing measurement results. Then further analysis is carried out, namely the LKPD Design Validation Results so that the suitability between the materials can be seen as to their harmony with the design created. The indicators for design analysis can be seen in Table 2.

Table 2. Criteria for Obtaining the Results of the Validation of LKPD Design

Scale	Value Score	Validation Level
4	65,00 – 80,00	Very good
3	50, 00 – 64,99	Good
2	35,00 – 49,99	Less Good
1	20,00 – 34,99	Not Good

Developing LKPD with an attractive design can encourage students' learning activities to become more interested and motivated in learning, so that design indicators such as Table 2 must really be observed and analyzed well. In the next stage, an analysis of teacher responses is carried out, the indicators of which can be seen in Table 3.

Table 3. Category Level of Teacher Response to LKPD

Scale	Value Score	Validation Level
4	39,00 – 48,00	Very good
3	30,00 – 38,99	Good
2	21,00 – 29,99	Less Good
1	12,00 – 20,99	Not Good

Teacher responses are very important for a development process so they must be observed and observed clearly, such as the indicators in Table 3. Next, analysis is given for student responses using the indicators in Table 4.

Table 4. Category Level of Learner Response (Small and Large Group Test) to LKPD

Scale	Value Score	Validation Level
4	32,50-40,00	Very good
3	25,00-32,49	Good
2	17,50-24,99	Less Good
1	10,00 -17,49	Not Good

The student response indicators in Table 4 are a benchmark for how the LKPD developed by researchers can be used better in the learning process. Students will respond according to the activities and habits carried out during the learning process.

RESULTS

Define Stage

At the defining stage define starts from the front end analysis. The front end analysis conducted is to discuss with biology subject teachers about the learning process and teaching materials used in class X SMAN 2 Kerinci. The results of the analysis obtained are that the LKPD used so far is still conventional or ordinary. The LKPD only contains a summary of the material, multiple choice questions, and is closed with a competition test containing objective and essay questions. Basically, in the field there are many LKPD which contain practice questions or reviews of teaching materials for each topic in the form of questions, but there are still few that focus on local wisdom. This is actually not an LKPD, but an evaluation sheet or assessment sheet. The LKPD does not train students to carry out the investigation process. Furthermore, the results of the student analysis showed that students in class Results of assignment analysis through interviews with class X biology teachers regarding students' lowest scores on biodiversity material. Meanwhile, the results of the curriculum analysis obtained information that the curriculum used was the K13 curriculum. The results of concept analysis through identification of curriculum concepts to be studied, namely biodiversity material. Based on this analysis, the researcher proceeded to the design stage.

Design Stage

At the design stage is the process of designing the LKPD prototype to be developed. This stage includes selecting the format and designing the LKPD. Furthermore, developing LKPD based on Kerinci local wisdom integrated discovery learning model that refers to process standards. After the design stage, then proceed to the development stage (development) to validate the product by experts (validators).

Figure 1. LKPD Design Cover

Development Stage

The development stage of LKPD based on Kerinci local wisdom integrated discovery learning model starts from observation, interviews and collecting supporting sources for the tools needed in the development. This observation was carried out in the customary forest area and interviewed traditional leaders of Kerinci. The results obtained include (1) The tradition of Mandi Balimau and kenduri seko, (2) Kenduri Padi tradition, (3) Various types of plants and animals found in the kerinci customary forest, (4) How to utilize the biodiversity contained in the customary forest by the local community, (5) The conservation system carried out by the community in the customary forest environment is a local customary system that has important values. Based on the results of these observations, the researchers then chose a learning model that suited the development needs of the LKPD. The model used in this LKPD is based on the local wisdom of Kerinci integrated discovery learning model. Furthermore, researchers prepare proto-type LKPD. After this initial stage of development is carried out, researchers validate the products that have been prepared in the form of expert validation and design. The research process was conducted using a coherent mindset in the learning process. The concept map in this study can be seen in Figure 2.

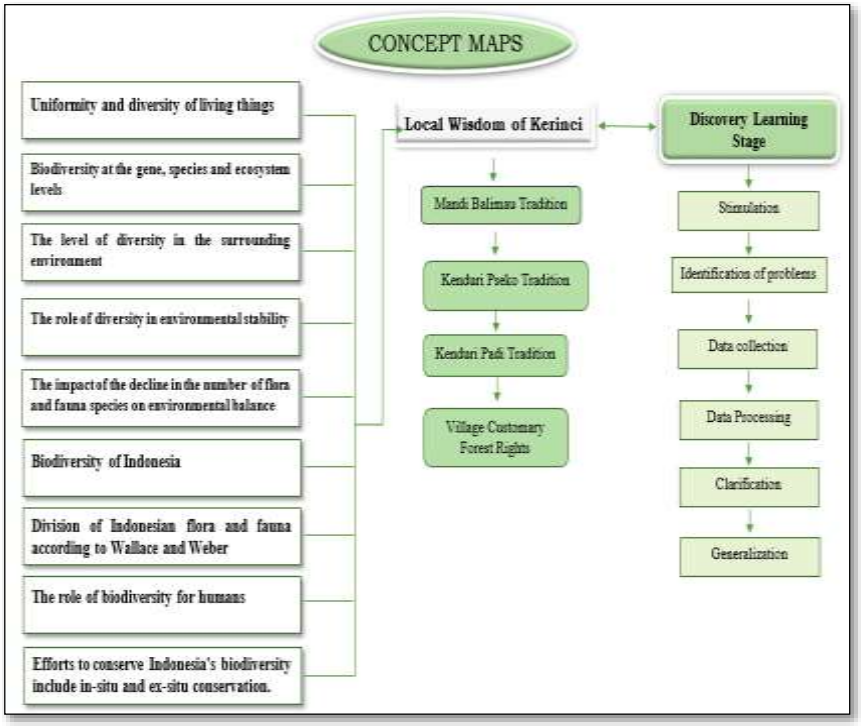


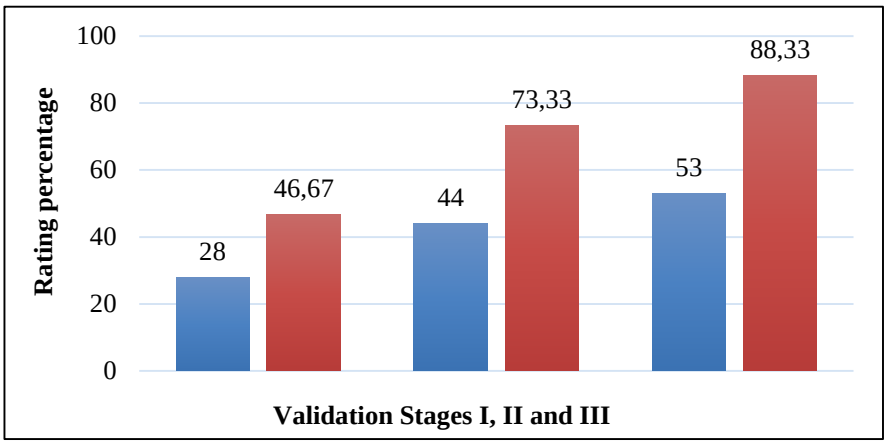
Figure 2. Research Process Concept Map

Product Validation

Expert Validation of LKPD Material

The research process was carried out in detail from research preparation, namely before the product was tested on students, the researcher first carried out validation, namely by being validated by experts in learning materials and also media design. The results of the analysis in the form of suggestions and input from validators can be used to control the

quality of teaching materials that have been developed (Lestari, 2013; Camo, Uy, & Molina, 2024; Kim, 2014). In the process of developing LKPD, there are several validator notes that must be considered, including three indicator aspects, namely, the formulation of learning objectives, the content/material presented, and aspects of language appropriateness. The results of expert validation are used to revise the LKPD that will be developed (Sezen & B, 2012; Suryaningrat, Mangunsong, & Riantoputra, 2020). The results of this validation become a reference for revising the product to produce a more valid, good and appropriate product. Material expert validation is carried out in 3 stages until the LKPD material is valid. Details of the material expert validation results are presented in Graph 1.

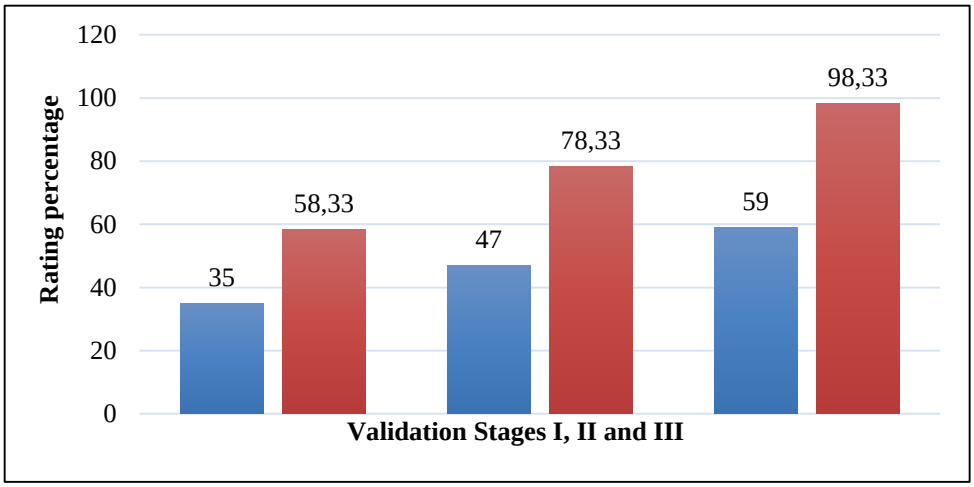


Graph 1. Percentage of Material Validation of the Learner Worksheet

Based on Graph 1, the results of the validation of LKPD material stage I obtained a score of 28 with a percentage of 46.67% in the not good category. Based on these results, the researcher revised all parts according to the validator's suggestions. Furthermore, the results of the LKPD material validation phase II obtained a score of 44 with a percentage of 73.33% in the good category. Researchers again revised the LKPD then continued validation to stage III. The results of the LKPD material validation stage III obtained a score of 53 with a percentage of 88.33% in the very good category. After getting a very good score from stage III validation, it means that the LKPD has been declared valid in other words, the Student Activity Sheet developed is ready to be tested on students.

Expert Validation of LKPD Design

The research process also carries out considerations with learning media experts, which, in this case, the researchers refer to as validation of design experts so that the LKPD created can really improve both creativity and student learning outcomes (Daryanes, Darmadi, Fikri, & Sayuti, 2023; Rusli, Hendri, & Sari, 2023). The process of validating the LKPD design was carried out three times, the results of which were several validator notes that had to be taken into account, including three indicator aspects, namely, graphic components, presentation, integration, and language presented. Validation of LKPD design experts is carried out in 3 stages until the LKPD design is valid. For more details, the results of the design expert validation are presented in Graph 2.



Graph 2. Percentage of Design Validation Results of Student Worksheet

Based on Graph 2, the results of the LKPD design validation stage I obtained a score of 35 with a percentage of 58.33% which is in the Not Good category. This stage is still a lot of overall improvement. The design validation of LKPD stage II obtained a score of 47 with a percentage of 78.33% which is in the good category. Researchers again revised the LKPD then continued validation to III. Validation of LKPD design stage III obtained a score of 59 with a percentage of 98.33% which is in the very good category. This shows that the Student Activity Sheet developed is ready to be tested on students.

Results of Teacher Response to LKPD

This research also asked for good analysis from the teachers who provided responses, namely Teacer The results obtained from the responses of the two Biology teachers regarding the LKPD based on the integrated discovery learning model of local wisdom can be presented in Figure 3.

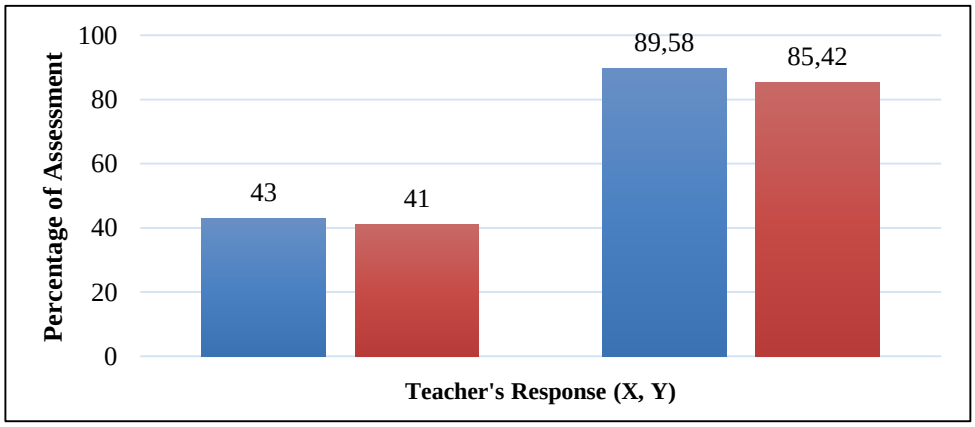


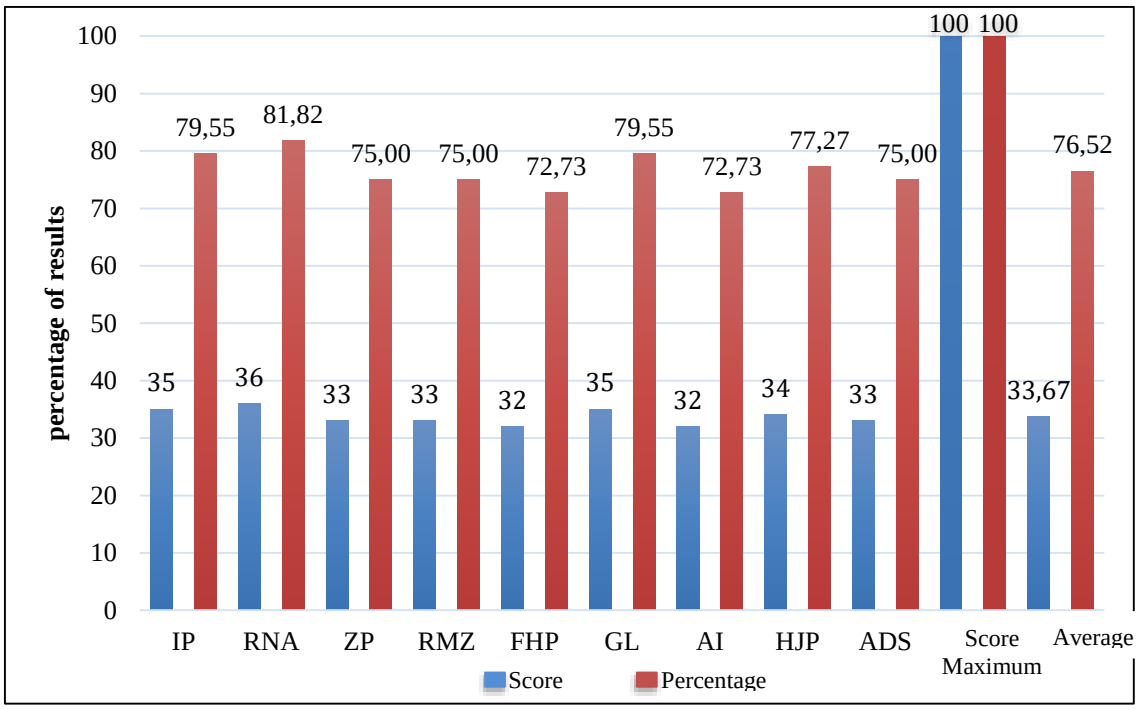
Figure 3. Results of Teacher Response

Based on the graph above, Mrs. Elfrida, S.Pd's response to the developed LKPD obtained a total score of 43 and a percentage of 89.58% including the very good category. Furthermore, the response of teacher X and teacher Y to the LKPD obtained a total score

of 41 and a percentage of 85.42% including the very good category. This shows that the LKPD developed is ready to be tested on students.

Learner Response to the LKPD Trial in the Small Group

The results of the small group trial are in the form of data from the student response questionnaire. Each learner is given an open questionnaire with questions that have been prepared. This trial involved 9 students in class X E SMA Negeri 2 Kerinci, totaling 9 high ability students, 3 medium ability students, and 3 low ability students. The results of the LKPD trial on students can be presented in the following Graph 5.



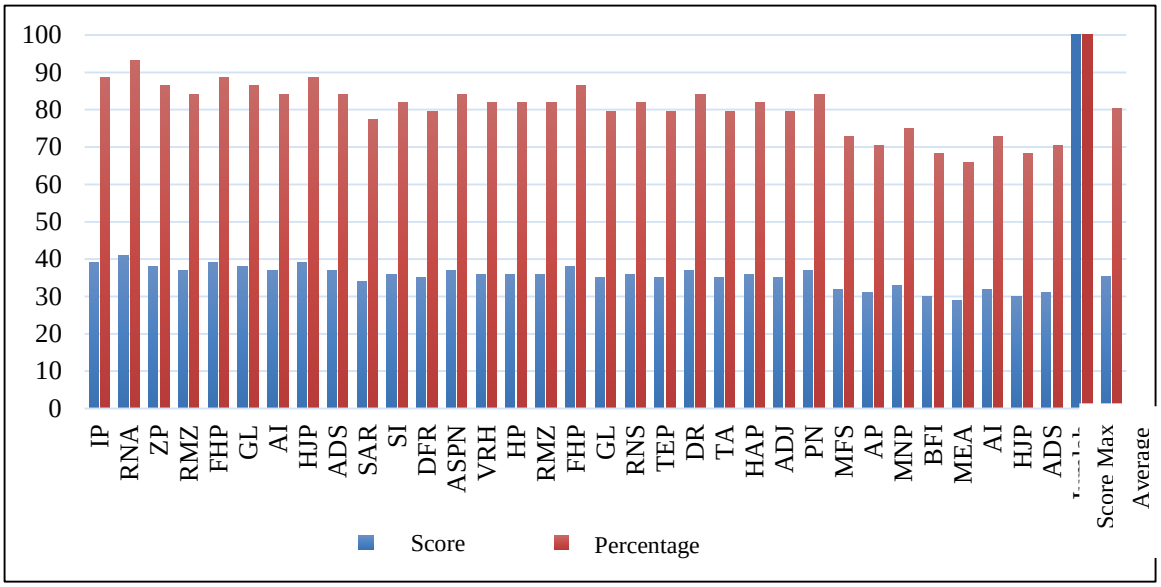
Graph 5. Results of Small Group Trials

Based on graph 5 above, it shows that the response of students in small groups to the LKPD based on Kerinci local wisdom integrated with the discovery learning model developed is positive. Of the 9 students who gave responses, all of them categorized "very good" with a total score of 33.67 and a percentage of 87.50%. The general conclusion is that the learning and LKPD products that are applied really help students in understanding learning material and make students learn actively, from the results of the small group trial, the products developed can be tested in large groups.

Learner Response to the LKPD Trial in Large Groups

The process of analyzing data from small group trials becomes a reference for improvement and benchmark for application analysis in group research which is the actual research subject or in this case called a large group. The results of large group trials are in the form of student response questionnaire data taken for all students. Each student is given an open questionnaire containing prepared questions. This trial involved all class X E

students of SMA Negeri 2 Kerinci, totaling 33 students. The results of the LKPD trial on students can be seen in graph 6.



Graph 6. Large Group Trial Response Results

The application of research development products produced quite good data for researchers, as seen in Graph 6. Student responses to the LKPD being developed looked positive, and almost on average, students responded well, as well as an increase in student learning creativity based on direct observations of researchers during the research process. Of the 33 students who answered, all were in the "very good" category, with an average score of 35.36 and a percentage of 80.37%. Learning using LKPD products based on the integrated learning model based on Kerinci local wisdom, which is applied, really helps students understand the learning material and makes students active in learning. From the results of testing large groups of products developed, it can be seen that the LKPD that has been developed can be used effectively and well, especially for studying biology subjects on biodiversity material. In the research that has been carried out, data and facts have also revealed that the results of teacher and student responses appear to have achieved very good criteria, so this LKPD is feasible and can be used in the biology learning process for biodiversity material. Local wisdom-oriented learning can improve student learning outcomes (Azizahwati & Mohd Yasin, 2017) because learning that seems contextually oriented to local wisdom makes it easier for students to understand the material used and applied in biology learning on biodiversity material.

CONCLUSION

The research process that has been carried out is supported by theoretical facts and based on the analysis that researchers have carried out regarding the development of the Student Activity Sheet, which in Indonesian is abbreviated as LKPD. The development of LKPD in this research is specifically for Biology subjects based on Local Wisdom in Kerinci district, which is inspired by the Discovery Learning learning model on

Biodiversity material for class X SMA Negeri 2 Kerinci, which was developed using the 4-D Model. The research results show that material expert validation, with a percentage of 88.33%, is in the very good category. Furthermore, the design validation results, with a percentage of 98.33%, are in the very good category. The research results also showed that biology teachers responded to the LKS developed with a percentage of 87.50% in the "very good" category. The results of the small group trial of students were 76.62% in the "good" category, while the results of the large group trial were 80.37% in the "very good" category. Based on the results of validation and field trials, LKPD based on Kerinci local wisdom, which is integrated with the Discovery Learning learning model on biodiversity material, is good and suitable for application in biology learning, especially on biodiversity material. Researchers hope that future research will focus more on the development process of each stage of the Discovery learning model, not just on research results or final results. Hopefully, the research researchers have produced can be the beginning of creating education based on the surrounding environment, which can be a solution and breakthrough for meaningful and enjoyable learning.

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