



Application of Inquiry Learning-Based LKPD to Improve Students' Interpersonal Intelligence

Alga Arine Fristya Yuniar^{1*}, Sri Wardani¹, Sudarmin¹, Sri Haryani¹, Elis Mokhtar²

¹Universitas Negeri Semarang, Indonesia

²Universiti Pendidikan Sultan Idris, Malaysia

Article Info

Keywords:

Interpersonal Intelligence,
LKPD, Inquiry Learning

Abstract

This study aims to improve interpersonal intelligence in the process of learning discussions, practicums, and presentations in schools. This research method is descriptive qualitative through in-depth interviews, direct observation and study of documents regarding the process of observing student collaboration (interpersonal). The focus of this research is the activeness of students during discussions, students' skills during practicum to develop Inquiry Learning-based worksheets and interpersonal intelligence. The data obtained is then analyzed, verified and constructed into a scientific knowledge that can be utilized as a source of learning in schools. The results and conclusions of interpersonal intelligence increase with a good average using inquiry learning-based worksheets.

*Correspondence Address:
E-mail: algaarine.unnes046@gmail.com

INTRODUCTION

LKPD includes printed learning media that can be used to support the learning process so that it is effective and efficient (Herman, 2017). LKPD will help as an effective interaction medium between students and teachers, so that it can increase students' learning activities in order to improve learning achievement (Arifiani et al., 2012). The use of worksheets from certain publishers as learning media makes students less likely to get meaningful learning experiences because the knowledge gained is only limited to memorizing theory and practicing questions (Febrianti et al., 2015). Teachers often use LKPD because it is practical in learning activities. However, most of the LKPD used in schools were not made by the eyes of the teachers themselves so that the goals and needs of chemistry learning were not optimally achieved. Chemistry subject matter in SMA/MA is relatively new material and is considered quite difficult for students (Ristiyan & Evi, 2016; Atagana & Engida, 2014). Chemical materials include concepts, chemical reactions and chemical calculations. Based on the results of previous research, one of the chemical materials that is still considered difficult for students is a salt buffer solution (Boncel et al., 2017). This was confirmed from the results of interviews with teachers, when on acid-based materials, salt buffer solutions and buffer solutions, students often have difficulty applying formulas to the questions given.

Intelligence related to the ability to interact with others is interpersonal intelligence. Interpersonal intelligence can improve students' ability to gather knowledge, analyze problems, think at a higher level and reason to construct concepts from problem solving (Lazear, 2004). Interpersonal intelligence can be improved and developed if students can plan, evaluate, and manage strategies that are used appropriately (Wardani et al, 2013). Interpersonal intelligence needs to be developed so that students can solve problems in scientific learning which are not only solved individually but in groups by collaborating with friends.

LKPD used by the teacher as a teaching resource to explain concepts and practice questions in solving chemistry problems. However, the existing LKPD only consists of a brief summary of the material and practice questions which do not yet contain aspects of variations in learning activities, problem solving and student understanding in chemistry lessons. LKPD from publishers usually contains a summary of the material and questions (Abdurrohim et al., 2016). The LKPD used also does not contain the steps of a particular learning model that can help train students to get used to solving the questions or chemical problems given. For example in writing down the reactions that occur, calculating the pH and analyzing the properties of salt solutions or buffer solutions.

The teacher said that the ability of students in calculating and applying chemical formulas was still quite low, causing abilities in chemical calculations and problem solving to be not optimal. This is shown from the results of the daily test evaluation of the material in the form of essay questions or descriptions. The majority of students did not work according to the steps for completing chemical materials and tended to answer by filling in short and direct ways, especially for questions of chemical reactions and calculations.

Problem solving ability is the ability to solve given problems by constructing the knowledge that students have to be linked to scientific knowledge through certain stages of completion. This ability is related to the intelligence that exists in students. One theory of intelligence is multiple intelligences. Multiple intelligences known as the theory of multiple intelligences (MI) put forward by (Gardner, 2003) states that MI theory provides an alternative way for teachers to apply the best learning methods. Intelligence is not something fixed, but intelligence can be trained. This shows that success does not only depend on intelligence, but also the role of the teacher in knowing and utilizing this intelligence to achieve student competency in the learning process (Sari et al., 2017).

The purpose of this research is to (1) increase the effectiveness of LKPD to increase student activity.

(2) improve students' interpersonal intelligence using inquiry learning-based worksheets. (3) student responses to inquiry learning-based LKPD.

METHODS

This research was developed with the Research and Development design model. Research and Development research is a research method used to produce certain products and test the effectiveness of these products (Sugiyono, 2010). This research uses R&D research (Research and Development) which refers to the modified 4D procedural model (Thiagarajan, 1974). The development of student worksheets in this study refers to the 4D model which is modified to 3D, namely the define, design and development stages. The dissemination stage was not carried out in this study.

Define stage At this stage problem identification and data collection are carried out (chemical curriculum analysis, material analysis, worksheet analysis, student analysis, teaching and learning process analysis and task analysis). The define stage describes preliminary research (surveys, observations, interviews, questionnaires and documents) until the problems to be solved in the research are found.

The design stage is the product design stage that will be developed to solve research problems. At this stage, designing LKPD based on Inquiry learning, revising the LKPD Sheet design and validating the LKPD design.

The develop stage is the development stage of a design that has been tested before. The product resulting from this development must be tested again in small-scale trials and large-scale trials, so that it is not yet a final product.

in people's lives so that science and culture become connected in the formation of the character of students. The integration of native science learning into learning in schools is very important to implement [13].

The main instrument in this research is himself, where the researcher collects as much information as possible, goes through verification, reconstruction, formulation and conceptualization to become a science researcher [15]. Then the data will be analyzed and then transformed into scientific knowledge in schools.

RESULTS AND DISCUSSION

The feasibility assessment of the LKPD was developed through several stages which include Defie including problem identification (curriculum analysis analysis, student needs analysis, material analysis and task analysis); Design includes formulating learning objectives, designing LKPD models, designing products, compiling research instruments, LKPD validation, LKPD revisions, and Develo includes small-scale trials, LKPD revisions, and large-scale trials.

Table 1. Results of Material Expert LKPD Validation Analysis

Assessment Indicator	Percentage (%)	Category
Suitability of the material with KD	86,11	Valid
Material Accuracy	93.33	Very Valid
Material Update	95.83	Very Valid
Encourage curiosity	100	Very Valid
Serving Technique	91.67	Very Valid
Presentation Support	97,92	Very Valid
Presentation of Learning straightforward	100	Very Valid
Communicative	97,22	Very Valid
Dialogic and interactive	91.67	Very Valid
Suitability with the development of students	83,33	Valid
Conformity with the rules of language	91.67	Very Valid
Overall rating	100	Very Valid
	93.77	Very Valid

The results of the material expert validity test showed very valid criteria for the assessment of the three validators. The average rating shows an average percentage of 93.77%. This shows that the developed LKPD is valid.

The feasibility of LKPD in the small-scale test is shown from the assessment which includes: 1) language aspects in statements number 1, 2, 6, and 9; 2) image aspect in statement numbers 3, 4, and 5; 3) design aspects 7, 8, 10, and 11; and 4) inquiry aspects 12, 13, 14, and 15.

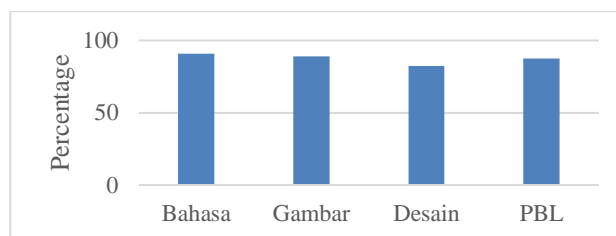


Figure 1. Recapitulation of Small-Scale Scale Test Questionnaires

on Figure 4.16 it shows that the response of the user (students) in each aspect results in a percentage of more than 75% with an average score of 87.43% on very good criteria. This shows that the development of inquiry-based worksheets is appropriate for use in learning. From filling out the response questionnaire, suggestions and comments were also obtained from students regarding the use of LKPD. Some suggestions are given regarding the display and language aspects which get the lowest average among the four aspects assessed. Students suggest that the LKPD display be presented in attractive colors. In addition, there are words or terms that are difficult to understand. Therefore, it is necessary to improve the use of effective words and sentences so that they are easier to understand.

The LKPD being developed is said to be feasible if the LKPD gets a minimum valid or valid assessment from the validator and gets a positive response from the legibility of the LKPD during the small-scale test. Assessment of the validity of LKPD based on Inquiry learning. The results of the development use a validation questionnaire sheet. The validity test carried out is construct validity. Construct validity is validity that considers statement items capable of measuring what must be measured in accordance with the specific concepts that have been defined. The validity assessment was assessed in terms of material and media aspects. The material expert's assessment aims to measure the feasibility of the material contained in the LKPD. The assessment of this material consists of three aspects, namely content, presentation and language. The media expert's assessment is intended to determine the validity of the LKPD as a learning media in the graphical aspect.

The material expert validator's assessment consists of three aspects, namely content, presentation and language. This Inquiry-based LKPD validity test involves 3 validators. Based on the results of the LKPD validation shown in Table 4.1, it can be seen that the LKPD developed is valid for use in learning, although there is still a need for improvement in several parts so that the LKPD is getting better. The results of the material expert validator's assessment of the inquiry-based LKPD which were developed as a whole reached 93.77% with very valid criteria. These results indicate that the developed LKPD is valid for small-scale trials.

Assessment includes aspects of content, presentation, and language. LKPD was developed containing material, activity content and information about salt buffer solutions and buffer solutions. Materials and learning activities are prepared based on the syntax of the INQUIRY model and indicators of achievement of competencies developed from basic competencies. LKPD presents chemical concepts related to salt buffer solutions and buffer solutions. There are supporting components for presentation in the LKPD such as case examples, sample questions, introductory words, and bibliography, all of which are presented in the LKPD. The content of LKPD aims to encourage active involvement in learning, examples of problems that are presented are easy to understand (Azizah & Nasrudin, 2018). In addition, LKPD also presents examples of problems related to everyday life to attract the interests of students who are oriented towards discussion and practicum activities.

The learning activities presented are learning activities that emphasize active learning. This is intended to encourage students to think and actively seek additional information from various related references, for example relevant chemistry books and the internet to solve existing problems in learning activities. Therefore, the display on LKPD is designed to increase attractiveness, motivation, and reduce students' boredom for learning (Ramdoniati & Hadisaputra, 2018). The preparation of the material in the LKPD is arranged in an interesting way because it displays pictures and colors, actual information can encourage students' curiosity.

The use of language in LKPD uses language that is easy to understand and communicative so that the contents of the LKPD presented are easy for students to learn. The language that follows the EYD rules is adjusted to the intellectual development of students. The sentences used are effective, communicative, and unambiguous sentences. Correct sentences or sentence patterns contain at least a subject and a predicate, so that the language used in LKPD is easy for students to understand and does not cause double meanings (Fatmawati et al., 2017). Thus, it is expected to facilitate students' understanding of the contents of the LKPD.

The media expert validator's assessment consists of graphical aspects. This Inquiry-based LKPD validity test involves 3 validators. Based on the results of the media expert's LKPD validation shown in Table 4.2 it can be seen that the developed LKPD is valid for use in learning. The aspects of graphical assessment are the size of the LKPD, the cover design of the LKPD, and the design of the LKPD content. From the results of the material expert validator's assessment of the Inquiry-based LKPD which was developed as a whole it reached 94.46% with very valid criteria and could be tested.

The Inquiry-based LKPD developed is a form of print media or printout with A4 paper size. The size of the LKPD is used to make it practical and easy for students to carry (Mutmainah & Nurhadi, 2018). The LKPD cover design uses images related to the material and is designed in light blue. The LKPD cover design uses letters that are easy to read. Graphical aspects of the contents of the LKPD were also validated. LKPD is dominated by white and light blue. The light blue color that contrasts with the white color will make it easier for students to read or use it. The typefaces or font styles used in compiling the contents of the LKPD are Baskerville Old Face, Times New Roman, and Arial. The font size uses size 12 so that it can be read clearly. LKPD is also equipped with illustrations, instructions for use, concept maps, and page numbers to make it easier for students to use LKPD.

The feasibility assessment of LKPD was carried out through small-scale trials in class XI IPA 6 with a total of 15 students. This small-scale trial aims to determine the readability of the LKPD. Learning was held in two meetings. Students take part in learning activities using the distributed LKPD. At the end of the learning activity, students were given a response questionnaire regarding the use of LKPD. The questionnaire was filled in to find out the response from students regarding the legibility of the LKPD. Responses from students to validate readability.

Assessments in this small-scale test include EYD rules, use symbols correctly, writing is clear, language used is communicative, pictures on LKPD are clear and easy to read (Haryani et al., 2017). From the results of the small-scale trial questionnaire analysis, it was found that the average score of all aspects assessed by the respondents was 87.43% in very good criteria. In addition, students also provide suggestions and comments on the LKPD used. From these suggestions and comments, the LKPD was revised so that large-scale trials could be carried out.

Broadly speaking, the suggestions given include the appearance of the LKPD and the images presented. Students suggest that the appearance of the LKPD be made more colorful so that it looks attractive. This is in line with research by (Aminudin et al., 2015) which states that LKPD is designed with images related to interesting material and colors with the aim of attracting students' interest in reading LKPD. The LKPD display should have a variety of color combinations and be supported by display pictures (Khabibah & Suyatna, 2018). Based on the assessment on the small-scale test, it can be concluded that the LKPD developed is declared fit for use in learning with a slight revision of the drawing and design aspects of the LKPD with an assessment percentage of more than 75% for each aspects.

There are five indicators of interpersonal intelligence analysis that are observed through the observation sheet. These assessments include processing empathy, providing feedback, listening to others, working together, and providing feedback. Assessment is carried out at the beginning and end of each material meeting to determine the increase in interpersonal intelligence. Assessment in this study was carried out by means of observation when learning activities took place by 3 observers. The criteria include very good, good, enough, and low. LKPD is declared effective for increasing interpersonal intelligence if the results of the analysis of interpersonal intelligence reach a minimum average of 75% with a minimum good criterion. The results of the interpersonal intelligence assessment are presented in Table 3.

Table 3. Interpersonal Intelligence Assessment Results

Material	Observational Assessment		
	<i>Beginning</i>	<i>End</i>	<i>Percentage</i>
Buffer solution	16,21	16,34	81.71%
Buffer Solution	16.93	17,31	86.43%

The results of the assessment of interpersonal intelligence on the salt buffer solution material achieved results at the initial meeting, namely 16.21 including good criteria and increased to 16.34 including very good criteria with a percentage of 81.71%. On the results of the assessment of interpersonal intelligence in the buffer solution material, the results at the initial meeting were 16.93, including very good criteria, and increased to 17.31, including very good criteria, with a percentage of 86.43%. Calculations can be seen in Appendices 40, 41, 46, and 47.

Each indicator of interpersonal intelligence is analyzed descriptively. The results of the average interpersonal intelligence scores for each material indicator of the salt buffer solution and the initial and final meeting buffer solutions are shown in Table 4 and Table 5.

Table 4. Results of Interpersonal Intelligence Indicator Analysis of Buffer Solution Material

Interpersonal Intelligence Indicator	Percentage (%)	
	<i>Beginning</i>	<i>End</i>
Empathy Processing	62,64	85,42
Provide Feedback	64,56	81,02
Listening to Others	61,48	82,18
Cooperate	60,56	80,79
Give Feedback	60,86	79,17

Table 5. Results of Interpersonal Intelligence Indicator Analysis of Buffer Material

Interpersonal Intelligence Indicator	Percentage (%)	
	<i>Beginning</i>	<i>End</i>
Empathy Processing	68,89	89,81
Provide Feedback	64,03	85,88
Listening to Others	64,95	86,34
Cooperate	64,03	87,27
Give Feedback	61,48	83,33

Based on Tables 4 and 5 it can be seen that the achievement of each indicator of interpersonal intelligence in the salt buffer solution and buffer solution material reaches more than 75%. This shows that the assessment of each indicator meets the minimum criteria for assessing interpersonal intelligence. In the results of the analysis of interpersonal intelligence for the two materials, the highest score was on the empathy processing indicator and the lowest on the response indicator. Based on these results, the students' interpersonal intelligence meets the minimum criteria of 75% with good or very good criteria so that LKPD can be said to be effective for increasing interpersonal intelligence.

The indicators assessed in this study included empathetic processing, giving feedback, listening to others, team building and inquiry and questioning which were observed through observation sheets. The assessment was carried out twice, namely at the beginning and end of the meeting on each buffer solution material with a total of three observers. This aims to determine the existence of an increase in interpersonal intelligence.

Learning directed at discussion activities can create two-way communication between group members resulting in feedback between students. This is very important so that communication is established in group discussions to solve the problems discussed. With a group, students feel more comfortable in expressing opinions without feeling afraid of being wrong compared to delivering individually in front of the class (Dina et al., 2015). In the course of the discussion, the attitude of students in listening to and accepting the opinions of others was also observed. Having an attitude of respecting and listening to others is closely related to interpersonal intelligence (Astuti et al., 2019). In addition, students are also accustomed to interacting with each other so that the cohesiveness of cooperation can increase both during discussions and presentations explaining the results of group work.



Figure 2. Discussion activities in groups

In the discussion and practicum activities that were formed in groups, the sense of cooperation to solve discussion problems was high. Discussion activities became more lively because active students gave each other input and expressed opinions when completing the activity sheet. Students are accustomed to discussing in groups to find solutions to their own problems even though they are slightly assisted by the teacher (Sastradewi et al., 2015). They also have an attitude of respect to listen to the opinions of other group members to be resolved together.

In addition to the achievement of interpersonal intelligence described, the lowest indicator is shown in the indicator responding to questions with the final percentage of 79.17% and 83.33%. In the course of the discussion and practicum, there were still students who felt embarrassed to express opinions and respond to the answers from other groups so that they were passive when the question and answer session took place. The development of interpersonal intelligence is influenced by the emotional intellectual factors of students involved in learning (Saufi & Royani, 2016). This is what causes students not to be confident with their own work and do not dare to express their opinions in class so that the indicator for responding to questions gets the lowest results among the other indicators.

CONCLUSION

Based on the research that has been done, several conclusions can be drawn: (1) Inquiry-based LKPD meets valid criteria with a validation level of material experts of 93.77% and media experts of 94.46% in the very good category. The small-scale test results met the eligibility criteria with an average rating of 87.43% in very good criteria. (2) Inquiry-based LKPD achieves the criteria of effectively increasing interpersonal intelligence with an average assessment of interpersonal intelligence tests for salt buffer solution and buffer solution material reaching 81.71% and 86.43% with very good criteria. (3) The responses of students to the Inquiry-based LKPD which was developed showed that 77.78% gave a very good response and 22.22% gave a good response.

REFERENCE

- Sumarni W, Sudarmin, Wiyanto, Supartono. the Reconstruction Of Society Indigenous Science into Scientific Knowledge in the Production Process Of Palm Sugar. *J Turkish sci educ.* 2016 ;13 (4):281–92.
- Le Grange L. Integrating Western and Indigenous Knowledge Systems: the Base for Effective Science education in South Africa? *int Rev educ.* 2007 ;53 (5–6):577–91.
- Pujiastuti RSE, Sudarmin S. Scientific Knowledge based culture and Local Wisdom in Karimunjawa for growing Soft Skills Conservation. *int J sci Res [Internet].* 2013 ;4 (9):2319–7064.
- Septiawan F, Azizah N, Gita PP, Khery Y. The Importance of Mobile Learning, Wisdom Local, And Tourism. *Biosci J Science Bio.* 2019 ;7 (2):146.
- Syafei I. Learning Model Development To Improve Thinking Ability Student Critical. *Psymphatic J Ilm Psychology.* 2016 ;2 (2):133–40.
- Purwita TD, Rosana D. the Effectiveness of Physics Subject-Specific Pedagogy based on Indigenous Knowledge to improve Students' Patriotism. *J Science Educator Fis Al-Biruni.* 2020 ;9 (2):313–22.
- Duit R. Science education research international: Conceptions, Research Methods, Domains of Research. *Eurasia J Math sci Technol educ.* 2007 ;3 (1):3–15.
- Chaudhuri B. Science in society: Challenges and Opportunities for Indigenous Knowledge in the Present-Day Context. *Globe Bioeth [Internet].* 2015 ;26 (2):78–85 .
- Whyte KP. Indigenous science (fiction) for the Anthropocene: Ancestral Dystopias and Fantasy of climate change Crises. *environment Plan E Nat Sp.* 2018 ;1 (1–2):224–42.
- Moyo PV, Kizito R. Prospects and Challenges of Using The Argumentation Instructional Method to Indigenize School Science teaching. *African J Res Math sci Technol educ [Internet].* 2014 ;18 (2):113–24.
- Sudarmin S, Asyhar R. Transformation Knowledge Science Traditional become Science Scientific in Process Production Jamu Traditional. *Edu-Science J Educator Mathematics And Knowledge Knowledge Natural.* 2012 ;1 (1):1–7.
- IW literature . Science Learning Model based Culture Local For Develop Basic Science Competence and Wisdom Value Local in JUNIOR HIGH SCHOOL. *J Educator And Learning.* 2010 ;43 (2):8–16.
- Sunday O. Effects of an Ethnoscience- Based Instructional Package on Students' Conception Of Scientific Phenomenon. (Atwater

1993):172–82.

Utari R, Andayani Y, Savalas LRT, Anwar YES. Utilization of Module Development Results Chemistry based Ethnoscience For Embed Attitude Conservation Environment in School

man 2 Lombok Middle. J servant Masters Educator IPA. 2021 ;4 (1):92–7.

Rahayu WE, Semarang UN, Article I. Development Module Ipa Integrated based Ethnoscience The Theme of Energy in Life For Embed Soul Conservation Student. Unnes sci educ J. 2015 ;4 (2).

Halim AA, Jawan JA, Ismail SR, Othman N, Masnin MH. traditional Knowledge and Environmental Conservation among Indigenous People in Ranau, Sabah. 2013;13(3).