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IMPROVING HOTS LITERACY USING THE PJBL MODEL WITH LEARNER WORKSHEETS-BASED GUIDED INQUIRY ON REACTION RATE MATERIALS

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ABSTRACT

The logical influence of the demands of teacher professionalism in the presentation of chemistry learning is the teacher's ability to create the right learning strategy in accordance with the problems faced in the world of education. One of the things that can be done in solving the problem in question is to transfer the old learning method with the new one. This study aims to determine the improvement of HOTS literacy by integrating the PjBL model with Guided inquiry students worksheed on the Reaction Rate material in class XI SMA and to describe the most developed aspects of HOTS literacy. This research is a Quantitative Descriptive research using an experimental method with a One-Group Pretest-Posttest Design design. The results showed that students' HOTS literacy ability increased through learning with the PjBL model with Crossword media, this was proven through a t-test that obtained a value $t_{count} > t_{table}$ (7.152 > 2,03452) with an N-gain value of 0.7079 (70.79%).

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INTRODUCTION

Science literacy is the main topic in the world of education that must be developed so that students can be competitive in the 21st century. Every student is required to master science literacy in social life because this literacy is related to the ability of students to relate issues about science and their ideas as citizens (Musayaroh *et al*., 2021). One of the challenges of 21st century education is that students are expected to master and apply High Order Thinking Skills through 4C (critical thinking and problem solving, communication, collaboration and creativity and innovation) (Rivalina, 2020). Based on the results of a study conducted using the Programme Internationale for Student Assessment (PISA) test, Indonesia is in the bottom 10 of the 65 countries that took the test. Students in Indonesia are still not fully trained to solve problems that have the characteristics of trends in international mathematics and science study (TIMSS) questions, which are contextual, require reasoning, argumentation, and creativity in solving them. This is one of the factors that caused the results of the PISA study conducted to be low (Panggabean *et al*., 2021). Chemistry is part of science, so it can be defined that chemical literacy is part of science literacy. Chemical literacy can be interpreted as a person's skill to understand and implement chemical knowledge in everyday life (Priyasmika & Yuliana, 2020).

In an effort to foster students' chemical literacy, it can be started by attracting students' attention during the learning process, for example by creating a pleasant learning atmosphere through the use of media in learning activities (Wahyuni & Yusmaita, 2020). One of the chemicals that high school students must master is the reaction rate. The reaction rate material contains concepts and theories that are important to understand, namely the molarity of a solution, because the reaction rate can be determined if the concentration of the reagent and the time required to react are known (Wulansari *et al*., 2016). The presentation of chemistry learning must be interesting and can motivate students and the teacher's ability to communicate effectively with students is also required in introducing the scientific method. The logical influence of these professional demands is the ability of teachers to create appropriate learning strategies in accordance with the problems faced in the world of education. One of the things that can be done in solving the problem in question is to transfer the old learning method with the new one (Sasmono, 2018). One of the learning models that can be applied by teachers in the classroom is the Project Based Learning (PjBL) model. The PjBL model is designed so that students can be directly involved in the learning process and create projects. In this case students are given the opportunity to design and make decisions regarding the idea that becomes a particular project. This will encourage students to be able to work in real terms in producing a product. All things related to the

project can be done by students if the student already understands the basic concepts. The average HOTS ability of students who were given the PjBL model was higher than that of students who were given direct learning and based on the analysis that had been carried out, it was stated that students with high chemical literacy abilities had a higher average HOTS score than students with low chemical literacy abilities (Simamora, 2022). One way that can be done to help students in developing chemical literacy skills is to provide evaluations to students in the form of question instruments based on chemical literacy. With this question instrument, it is hoped that students will become chemically literate (Prastiwi *et al*., 2017). A study showed that the Crossword game is considered effective to be applied as a medium in the learning process. In 1927, the Chemistry Crossword Puzzle was said to be an activity that needed attention to be used in Chemistry learning. As a recent study, illustrates the effectiveness of crossword puzzle games when used as a recreational tool for learning (Pearson, 2020). Similarly, research conducted by (Niswara *et al*., 2019) that the use of crossword puzzle media has a good impact on the learning process where the media can help students in honing memory and developing analytical skills. Based on the description and phenomena above, it is necessary to carry out learning that is able to hone students' critical thinking skills and the ability to analyse the relationship between chemistry and everyday life. In this case, learning is carried out through the PjBL model with crossword media in an effort to improve students' HOTS literacy skills on the Reaction Rate material.

LITERATURE REVIEW

The Nature of Learning: Learning is a conscious activity carried out by a person through education or experience that generates the behaviour of changes that include cognitive, affective and psychomotor aspects (Faizah, 2017). Learning results in transformation in a person who is already facing the learning process. The transformation can be present in the form of behaviour or an actual skill. Basically, there are two important factors that affect learning, namely internal factors and external factors. The internal factor itself is a factor directly related to oneself which includes three main components, namely physical, psychic and fatigue factors. Meanwhile, external factors are those that come from outside the individual which consists of family factors, school factors, and community factors (Setiawan, 2017). In principle, learning and learning are activities that are inseparable from human busyness, by learning a person can increase his capacity. The actualization of abilities greatly helps the human being to align himself to meet his needs (Rosmiati, 2022). Chemistry learning is always solved in a problem-related and structured way, so for chemistry students it is not only limited to science as facts, theories or principles, but also a course of knowledge. After studying chemistry material, through practicum activities, students must get learning experience in the application of the scientific method, so that learning goes better (Andriani & Yonata, 2018).

Learning Outcomes: A person who has carried out learning activities will see changes in one or more aspects of behaviour as an influence of learning outcomes (Afandi *et al*., 2013). Learning outcomes are understood as an important indicator in estimating the success of the learning process. Learning outcomes act as a measure of the level of student understanding of a material being taught, after students have undergone the learning process for a certain period of time, and are expressed as grades. Therefore, it can be said that learning outcomes are the results that students achieve after learning, which are realized through changes in the reactions and attitudes of learners (Dahlan *et al*., 2019). Learning outcomes can be improved with the help of different learning strategies. One way is to use learning media. Learning media in this case has a very decisive role in the learning process, so that students with the help of teaching aids get concrete representations and direct experiences that help to have a concrete understanding in teaching and learning. Learning outcomes encourage knowledge and understanding of a person so that they have skills in the form of habits, attitudes, and ideals in life (Humaira *et al*., 2015).

Science Literacy: Science literacy is focused on building students' knowledge in order to apply science concepts meaningfully, think critically and make balanced and adequate decisions on problems that have relevance to student life. In addition, in science literacy, it is also necessary to develop the skills to interact collectively, self-development with a communicative approach, and the need to show understandable and persuasive reasoning in putting forward arguments in scientific social issues (Bafada, 2021). Building science literacy means focusing on building students' knowledge in using science concepts meaningfully, thinking critically and making balanced decisions on significant problems with student life. The science literacy ability of students in Indonesia can be influenced by several factors, one of which is the selection of learning methods and models by teachers, as well as the delivery of material that is carried out appropriately in science learning can contribute to the achievement of the objectives of one's science literacy training (Khery *et al*., 2019).

Higher Order Thinking Skills: Higher order thinking skills (HOTS) are different from higher order thinking (HOT). Based on Bloom's revised taxonomy HOT deals with cognitive abilities in analysing, evaluating, and creating. Meanwhile, HOTS is related to the ability to solve problems, think critically, and think creatively. It has been discussed that in HOTS there is a HOT component, for example to be able to solve problems (problem solving) students must be able to do analysis and evaluation. Likewise, to be able to think critically, students must be able to reason, consider, analyse and evaluate. This led some researchers to make an equivalence by comparing various taxonomies and terms associated with HOTS and HOT. Problems or problems that can trigger the formation of higher-order thinking skills are problems that cannot be solved using simple memory, but in solving them requires certain strategies and processes (Sani, 2019). HOTS is an important ability, where students learn not only to remember and understand, but to be much deeper in analysing, evaluating, and creating (Pratama *et al*., 2020). Critical thinking is a skills and responsible thinking process when a person studies a problem from all points of view and is involved in an investigation so as to obtain the best opinion, judgment, or consideration using his intelligence to draw conclusions (Sani, 2019). The characteristics of HOTS questions are (1) measuring the ability to think at a high level, not just the ability to remember, know, or repeat so that the answer to the question is not explicitly expressed in the stimulus. (2) based on current contextual and actual problems (though not all of them), for example about the environment, health, earth and space, as well as the use of science and technology in various aspects of life. (3) using various question forms as used in PISA, aiming to provide more detailed and comprehensive information about students' abilities (Pangesti, 2018).

HOTS Literacy: Literacy is at the heart of education, building a community environment is essential to achieve the goals of reducing poverty, reducing mortality, limiting population growth, and achieving gender equality (Dinni, 2018). To increase competitiveness and fighting power to face the challenges of the 21st century, Indonesians must master six basic literacy: (1) language literacy, (2) numeracy literacy, (3) science literacy, (4) digital literacy, (5) financial literacy, and (6) cultural literacy and citizenship (Pangesti, 2018). The high-level thinking ability (HOTS) that students must have is closely related to science literacy skills. Science literacy is the ability to use scientific knowledge, identify questions, draw conclusions based on evidence to understand and help make decisions regarding nature and the changes made to nature through human activities (Wati *et al*., 2019).

Project Based Learning (PjBL) Model: Project Based Learning model is an oriented learning model so that students can learn independently in solving problems that are being faced so that they can produce a project or real work (Niswara *et al*., 2019). The use of appropriate models can involve active students to think and develop knowledge, providing support and opportunities for students to develop their ideas (Sugiharti & Muliaman, 2016). The project-based learning model is closely related to the scientific approach, because

the scientific approach is the spearhead that integrates the science of learning both starting from the emergence of problems (Sumarti *et al*., 2015). The Project Based Learning model has several principles, namely: a) Centrality, affirming project work as the core of the curriculum. As a learning strategy, students are required to be able to learn the main concepts of a certain knowledge through project work. Thus, project work is not defined as additional practice and applicative practice of the concept being studied, but rather is central to learning activities in the classroom; b) Driving Question, entrusting project work emphasizes questions and problems that can motivate students to obtain the main concepts and principles; c) Constructive Investigation, the principle of constructive investigation leads to the achievement of objectives, which contains the process of inquiry, concept building, as well as resolution; d) Autonomy, means student independence in carrying out the learning process. The details are freedom to make your own choices, minimal supervision, and full responsibility; e) Realism, affirming the project as something real and real (Susanti, 2019).

The Project Based Learning model emphasizes the long-term learning process, students are directly involved with various issues and problems of daily life, learn how to understand and solve real problems, are interdisciplinary, and involve students as actors starting from designing, implementing and reporting the results of activities (student centred). Syntax or stages of the Project Based Learning model: (Devi, 2016)

a. ***Start With The Essential Question:*** Learning begins with essential questions, which are questions that can assign learners to an activity.
b. ***Design a Plan For The Project:*** Planning contains the rules of the game, the selection of activities that can support answering essential questions, integrating various possible subjects, and knowing the tools and materials that can be accessed to help with the completion of the project.
c. ***Create a Schedule:*** Teachers and students collaboratively schedule activities in completing projects, including: (a) creating a timeline for completing projects, (b) creating project completion deadlines, (c) students if they will plan new ways, (d) guiding students to carry out projects, and (e) students to make explanations for project selection.
d. ***Monitor The Students and The Progress of The Project:*** Monitoring is carried out by teachers using rubrics that can record the entire activity. The teacher acts as a mentor for student activities
e. ***Assess the Outcome:*** Assessments are conducted to assist teachers in measuring the achievement of standards, evaluating the progress of each student, providing feedback on the level of understanding that students have achieved, assisting teachers in developing the next learning strategy.
f. ***Evaluate The Experience:*** At the end of the learning process, teachers and students reflect on the activities and results of projects that have been carried out. The reflection process is carried out both individually and in groups to develop discussions in order to improve performance during the learning process, so that in the end a new finding is found to answer the problems posed in the first stage of learning.

Learning Media: Learning media is a collection of various types of components that exist in the student environment so that they are more aroused to follow the lesson well. Media can also be used as a way to channel material messages to students. There are many types and kinds of learning media. From the simple and cheap to the sophisticated and expensive. Some can be made by the teacher himself and some are factory-produced. Some are already available in the environment to be directly utilized and some are deliberately designed. The most important criterion in media selection is that the media must be adjusted to the learning objectives or competencies to be achieved. For example, if the purpose or competence of students is memorizing words, of course, the right audio media to use. If the objectives or competencies achieved are in the nature of understanding the content of the reading, then more appropriate print media is used. If the learning objectives are motor (motion and activity), then film and video media can be used. In addition, there are other complementary criteria, such as cost, efficiency, student circumstances, availability, and technical quality (Akhiruddin *et al*., 2019).

Guided Inquiry Model: (Milfayetty *et al*., 2014)**,** According to, a learning model is a whole form of a series consisting of approaches, strategies, methods, techniques, and learning tactics. A learning model is a form of learning depicted from beginning to end and presented uniquely by the teacher. (Milfayetty *et al*., 2014), The learning model consists of four groups, namely (1) the social interaction model; (2) the information processing model; (3) the personal-humanistic model; (4) the behavior modification model Even so, the use of the term learning model is often identified with learning strategies. The inquiry which in English is called *Inquiry*means to question or examine on the investigation. Inquiry is a general process that humans carry out to search for or understand information (Trianto, 2009). In the teaching and learning process, an inquiry is used as a teaching method that allows students' ideas to act as investigations to be carried out by students. Inquiry learning strategy is a series of learning activities that emphasize the process of thinking critically and analytically to find and find for yourself the answer to a problem in question (Sanjaya, 2011), this is the purpose of the inquiry learning model. So that through a guided inquiry learning model based on discovery, it can foster the ability of students to develop the potential of the mind to the maximum through the thought process to find solutions to problems given thorough investigation. It is this character that can train the critical thinking skills of learners (Febriani & Ismono, 2020). Guided inquiry activities in learning can improve the high thinking level of learners. The learners are required to create knowledge for themselves through data collection and analysis, evaluating data, and communicating results in discussions (Tuqa *et al*., 2017). The following are the advantages of the guided inquiry model, namely (Hartati, 2017): (1) The application of the guided inquiry method can improve science learning; (2) Can further develop the ability of students to analyze and make conclusions; (3) Increase the independence of students in learning without explanation of the material from the teacher; (4) Provide hands-on learning experiences; (5) Learners are more active because they are involved in the discovery process; (6) Develop cognitive, affective, and psychomotor aspects of learners.

While the weaknesses of inquiry are as follows: (1) It is required that there be a mental expansion for this way of learning; (2) This method is less successful for teaching in large classes; (3) The expectations placed on this strategy may disappoint teachers and learners who are already familiar with traditional planning and teaching; (4) This method is considered to be too concerned with the acquisition of understanding and pays less attention to attitudes and skills; (5) The facility to try ideas may not be complete. The application of learning with an inquiry model is not easy but through an obstacle. The obstacle in applying this inquiry model is the time used in the learning process (Khasanah, Nur & Suyanto, 2016). The instrument used is a student HOTS Literacy ability test on the reaction rate material in the form of an objective test consisting of 20 items of HOTS literacy-based multiple choice questions that have met the criteria through the test of Validity, reliability, difficulty level, and differentiating power of the test. This test instrument has a cognitive level of C4 literacy, C5 literacy, and C6 literacy. Each question item contains literacy aspects, namely questions using real-world contexts, questions providing questions related to visual analysis, questions asking the reasons for the answers given, and questions using various forms of questions (multiple choice). Data analysis in this study used several tests consisting of hypothesis testing using t-test and HOTS Literacy ability analysis using the N-gain formula, as well as prerequisite tests on data with normality tests and homogeneity tests.

RESULTS AND DISCUSSION

HOTS Literacy *Pretest* and *Posttest* Data: The calculation results are based on tabulation data of test results, obtained *pretest* and

posttest values summarized in Table 1. The two test results were analyzed to determine the improvement in students' HOTS Literacy ability using the N-Gain formula. After the data is tabulated, it obtains the average, standard deviation, and variance.

Table 1. HOTS Literacy Data

HOTS Literacy Skills	Average Value
Pretest	37,65
Posttest	81,235

Based on Table 1. The average result of the pretest value was 37.65 and *the posttest* was 81.235.The following is a diagram of the average *pretest* and *posttest* scores of students' HOTS Literacy skills.

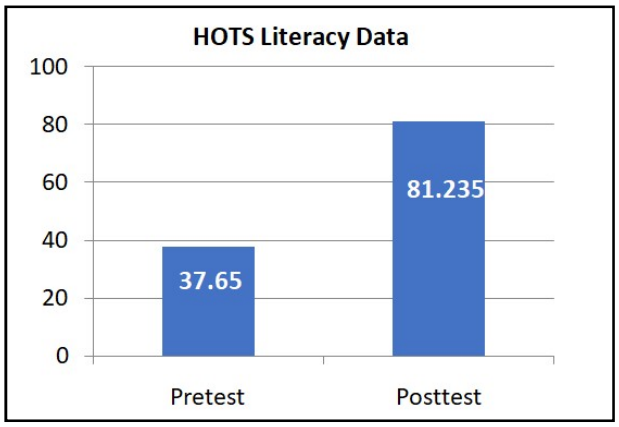

Figure 1. Diagram of the *average value of pretest* and *posttest* HOTS Literacy

Normality tests for *pretest* and *posttest* data were performed using the Chi Squared Test (X^2) with a significant degree of $\alpha = 0.05$ and if the data met the Chi Squared $X^2_{count} < X^2_{tables}$ then the data is declared normally distributed. The data on the results of the normality calculation are summarized in Table 2. following.

Table 2. Normality Test Results

Data	X^2_{count}	X^2_{tables}	Information
Pretest	8,65	11,07	Normal Distribution
Posttest	8,42	11,07	Normal Distribution

Based on the normality test result table, it is known that *the pretest* data has criteria $X^2_{count} < X^2_{tables}$ (8.65 < 11.07) and *posttest* data has criteria $X^2_{count} < X^2_{tables}$ (8.42 < 11.07). So it was concluded that *the pretest* and *posttest* data in this study were normally distributed at a significant level of 0.05. In this study, N-Gain testing was carried out to measure the level of understanding of students after being given treatment in the form of learning using the PjBL model with crossword *puzzle* media. Before being given treatment, a pretest is first carried out by providing a HOTS Literacy instrument to students. The instrument consists of 16 HOTS Literacy questions, each of which consists of five answer choices (*options*) with a processing time of 35 minutes. After being given treatment, a posttest was then carried out by giving 16 items of HOTS Literacy questions that were the same as the *pretest*. The results of calculating the value of N-gain in this study are summarized in Table 3. following.

Table 3. N-gain calculation results

Pretest	*Posttest*	N	N-gain	Interpretation of N-gain
37,65	81,24	34	0,7079	Tall

Based on the results of the N-gain calculation, it was obtained that there was an increase in student HOTS Literacy by 0.7079 or 70.79%, this increase was on the high N-gain criteria.

The normality test for the HOTS Literacy Ability N-gain data was carried out using the Chi Squared Test (X^2) with a significant degree of $\alpha = 0.05$ and if the data met the Chi Squared $X^2_{count} < X^2_{tables}$ then the data was declared normally distributed. The results of calculating the normality of the N-gain data are listed in Table 4. following.

Table 4. N-gain Normality Test Results

Data	X^2_{count}	X^2_{tables}	Information
N-gain	5,2	11,07	Normal Distribution

Based on the table of normality test results, it is known that N-gain data has criteria $X^2_{count} < X^2_{tables}$ (5.2 < 11.07). So it was concluded that the N-gain data in this study were normally distributed at a significant level of 0.05. After testing the normality and homogeneity of the data, the hypothesis test was then carried out using a hypothesis test of one sample group, namely the one-party t-test (right party) to find out whether the hypothesis in this study was accepted or rejected. The decision-making criterion in hypothesis testing is that if $t_{count} < -t_{table} {}^{1}/_{2}\alpha$ and $t_{count} > t_{table} {}^{1}/_{2}\alpha$ then the alternative hypothesis (Ha) is accepted dan null hypothesis (Ho) is rejected with degrees of freedom (df) = n-1and $\alpha = 0.05$ then ${}^{1}/_{2}\alpha = 0.025$. In this case critical regions are obtained at $t < -t_{(0.025)(33)}$ and $t > t_{(0.025)(33)}$, i.e. $t < -2.03452$ and $t > 2.03452$. The results of the analysis of uji hypotheses can be in Table 5 following.

Table 5. Results of hypothesis test analysis

Data Sources	t_{count}	t_{table}	Ket.
Posttest	7,152	-2.03452 and 2,03452	Ha accepted

Based on the results of the hypothesis test analysis, it was obtained that $t_{count} > t_{table} {}^{1}/_{2}\alpha$, then the decision taken was to reject Ho or accept Ha. It can be concluded that students' HOTS Literacy ability in reaction rate material has increased significantly, or it can be said thatstudents' HOTS Literacy scores are not the same as KKM scores after the application of the PjBL model with Crossword Puzzle media in learning. Based on the scoring of the test instruments given to 34 students, the percentage results of each indicator were obtained. In this case, the test instrument used has three indicators, namely C4 literacy, C5 literacy, and C6 literacy. At this stage, scoring is carried out which is focused on each HOTS Literacy indicator in each student which is then calculated the average percentage of each indicator that is successfully answered by students. Based on the results of the calculations carried out, the highest average percentage on the C5 Literacy indicator was obtained, then the C4 Literacy indicator, and the lowest average percentage on the C6 Literacy indicator. The results of the calculation of the percentage of student HOTS Literacy can be seen in Table 6. following.

Table 6. HOTS literacy percentage per indicator

HOTS Literacy Indicators		
C4 Literacy	C5 Literacy	C6 Literacy
68,89%	72,45%	67,65%

The data from the calculation of the HOTS literacy percentage can be seen in the form of a diagram as follows. In this study, as many as five meetings were conducted with face-to-face learning. At the first meeting, students were given pretests of 16 HOTS Literacy questions with indicators of C4 Literacy, C5 Literacy, and C6 Literacy which have been declared valid and can be used. This is done to find out the

ability of students' initial HOTS Literacy before being taught using the PjBL model with crossword media. Furthermore, learning is carried out in class by applying the PjBL model with crossword media, in this case students carry out a project in the form of conducting experimental activities on Factors Affecting Reaction Rate with group of friends.

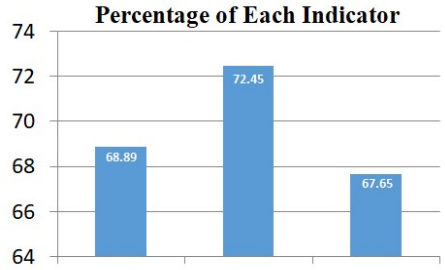

Figure 2. Percentage chart of each indicator

The phenomena used as a reference are things related to the rate of reaction that can be found in everyday life, then each of the groups made a video containing the implementation of the experiments carried out. The results of the experiment are written in the form of LKPD which is then presented in front of the class. At the fourth meeting, students filled in the HOTS Literacy *Crossword Puzzle* which contains the reaction rate material, in this case students fill in the empty boxes on the media by reading and understanding the narratives related to HOTS Literacy Reaction Rate which refers to each box number. At the fifth meeting, students were given a posttest with the same question items as the pretest, namely 16 HOTS Literacy questions, this was done to find out the final HOTS Literacy ability of students after being taught with the PjBL model with crossword *puzzle* media. This is in line with research that has been carried out (Muliaman & Mellyzar, 2020) that learning carried out with the *Project Based Learning* (PjBL) model has advantages in helping students to be able to sort, develop, foster motivation, oral and written communication and develop group work so that the increase in learning outcomes obtained is high as evidenced by an increase in students' average scores. Based on the analysis carried out in the research conducted (Niswara et al., 2019),it can be concluded that the use of *crossword puzzle* media has a good impact in the learning process where the media can help students in honing memory and developing analytical skills. Based on research conducted(Simamora, 2022) which states that the average HOTS ability of students who are given the PjBL model is higher than students who are given direct learning and based on the analysis that has been carried out, it is stated that students with high chemical literacy abilities have a higher average HOTS score than students with low chemical literacy abilities. In this study, the PjBL model provides the first step in an effort to collect and design a chemical project based on new knowledge and student experiences in real life. The application of the PjBL model is more effective and efficient if it is assisted by the use of media or in this case a *Crossword Puzzle*. Crossword Media is used in training students' HOTS Literacy skills gained during three meetings. The media contains HOTS Literacy questions where each question has a narrative that uses a real-world context, questions given related to visual analysis, and questions asking the reason for the answers given.

DISCUSSION

From the results of data calculation based on the tabulation of test results in this study, an average pretest value of 37.65 and a posttest average value of 81.235 were obtained. The calculation of the normality of the pretest and posttest data was carried out using the Chi Square Test and obtained the Chi squared pretest value of 8.65 and the posttest Square Chi value of 8.42 thus concluded that the pretest and posttest data are normally distributed because $X^2_{count} < X^2_{table}$. For the calculation of normality of the N-gain data, the same test was used and a calculated Chi Squared value of 5.2 was obtained which indicates that the N-gain data is normally distributed. Data homogeneity testing in this study was carried out using the Homogeneity Test of one sample group by determining sample variants and sample variation standards in pretest and posttest data. Based on the test results, a pretestsample variant of 125,084 and a posttest sample variant of 86,067 were obtained, while the standard deviation value of the pretest sample was 11,184 and the standard deviation of the posttest sample was 9,164. In the calculation of the increase in HOTS Literacy using the N-gain formula, a value of 0.7079 or 70.79% was obtained, it states that the student's level of understanding meets the high N-gain criteria. This shows that learning using the Project Based Learning (PjBL) model with Crossword Media provides an increase in students' HOTS Literacy skills. Based on the calculation of the HOTS Literacy percentage of each indicator, it was found that the percentage of questions with the C4 Literacy indicator was 68.89%, the C5 Literacy indicator was 72.45%, and the C6 Literacy indicator was 67.65%. This means that in this study, the most developed literacy aspect through the PjBL model with Crossword Media is C5 Literacy with the highest percentage, which is 72.45%. Based on the results of hypothesis testing of one sample group with a two-party t-test, t_{count} value of 7.152 and t_{table} value of $t_{(0.05)(33)}$ of 2,03452 or it was stated that $t_{count} > t_{table}$ (7.152 >2,03452) so that the hypothesis (Ha) is accepted and concluded that there is an increase in student HOTS Literacy using the PjBL model with crossword puzzle media on the reaction rate material.

CONCLUSION

Based on the results of the research, discussion and discussion that have been described, it is concluded that the HOTS Literacy of students who are taught with the PjBL model with the crossword puzzle media on the reaction rate material has increased. This can be seen through the calculation results in the t-test where $t_{count} > t_{table}$ which is 7.152 >2,03452 with an N-gain value of 0.7079 or 70.79%. In this study a spec of cognitive HOTS Literacy that was most developed through the PjBL model with crossword media in this study was the C5 Literacy aspect. This is evidenced by the results of calculating the percentage of each HOTS Literacy indicator, namely the percentage of C5 Literacy aspects of 72.45%, C4 Literacy aspects of 68.89%, and C6 Literacy aspects of 67.65%

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