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The Impact of the PBL Models Helping iSpring Presenters on Student HOTS Literacy on Reaction Rate

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Abstract: *Science literacy in social life is a very important competence for students as it relates to their ability to link problems in science with their perspective as citizens. One of the logical consequences of the need for teacher professionalism in the presentation of chemistry learning is the teacher's ability to create the right learning strategies that fit the problems facing today's education world. The transfer of old learning methods to new ones is one way to solve the problem. The aim of this study is to find out whether the increase in HOTS literacy occurs when the PBL model is integrated with the iSpring Presenter media on the Reaction Speed material in class XI SMA. The research will also explain the most evolving HOTS element of literacy. This study is a Quantitative Descriptive Study using experimental methods with One-Group Pretest-Posttest Design. The results of the study showed that the literacy ability of HOTS students improved through learning with the PBL model with iSPring Presenter media, this was demonstrated through the t test obtained t_{count} > tables (10,55 > 2,032245) with N-gain values of 0.7639 (76.39%).*

Keywords: *PBL model; iSpring Presenter; HOTS Literacy; Reaction Rate*

INTRODUCTION

Various areas of life witnessed rapid transformation during the 21st century, including economics, communications, technology, and information. These advances must be balanced with an understanding of 21st-century thinking skills, such as literacy, collaboration, communication, critical thinking, creativity, and innovation (Wibowo & Ariyatun, 2020). In modern learning, 4C is known as creativity, critical thinking, communication, and collaboration (Simamora, 2022). According to Pisa 2018, students in Indonesia are still considered low-income. Indonesian students scored an average of 72, 71, and 70 out of 78 countries in terms of achievement in science, reading, and mathematics (Khasanah & Sumarni, 2021). One of the reasons the learning process becomes uninteresting is because teachers do not design learning models or methods and lack teachers' knowledge about the use of media and learning models that are interesting to students in learning processes. One reason why the learning process becomes uninteresting is because teachers lack the knowledge and skills to design engaging learning models and effectively use media in the classroom (Silvia, et al, 2021).

Students are given priority in the problem-based learning model (PBL), which covers all parts of the pre- and post-learning process, as well as related facilities used directly or indirectly during education. In addition, the model syntax has the ability to measure and meet the KD's reaction speed requirements so that students can engage in the process of discovering material concepts. In addition, the model meets the 2013 curriculum requirements, namely active learning, and incorporates problem-solving stages into the learning process.

Materials Chemistry The speed of reaction belongs to the category of chemistry that is most important for students to study. This is because it is very relevant to everyday life and can guide students to improve their ability to think critically (Ramadhanti & Agustini, 2021) .This is because the speed of reaction involves many abstract sciences, such as the theory of the impact, the order of reactions, the equation of the velocity of the reaction, and the variability of the response speed (Muliaman, 2021) .

Information technology-based learning media are physical, non-material tools that enhance teacher and student learning (Dwiningsih et al., 2018). One of the interesting and practical educational resources is the iSpring Presenter media. The e-learning learning management system includes iSpring Presenter, a tool that converts presentation files to SCORM/AICC and flash formats (Azhar, 2021). With iSpring Presenter media, they can create quizzes with various kinds of questions and make the material file or presentation more interesting and interactive by incorporating a variety of media, including text, images, animations, audio, and video.

LITERATURE REVIEW

A. Learning theory of chemistry

Learning, according to Hamalik, is a process of growth or transformation in a person that is reflected in new behaviors resulting from experience and practice. Such behavioral transformations include the shift from ignorance to knowledge, increased understanding, changes in attitudes, modifications of habits and skills, the urge to appreciate, and the development of social and emotional characteristics (Hamalik, 2016). Chemistry, one of the subdisciplines of natural science (IPA), studies the structure, composition, properties, and changes of matter and energy.

Furthermore, because of the vast influence of chemistry on various fields of science, such as technology, agriculture, health, and fisheries, chemists are also vital to be studied and understood conceptually, factually, and procedurally. Experiences or exercises that include physical and psychological components influence learning, resulting in stable behavioral change.

Learning chemistry means understanding all the chemical aspects, including macroscopic, submicroscopical, and symbolic (Muderawan, et al., 2019). A macroscopic representation is a concrete level of concrete in which students see events and facts through everyday experiences or experiments. In chemical reactions, there are odors, changes in color, gases, and deposits, which are some of the phenomena that can be observed. Submicroscopic representations are used to explain macroscopic phenomena that are not easily visible to the eye. In symbolic representations, chemistry, mathematical equations, graphs, mechanisms of reactions, and analogies indicate macroscopic and submicroskopic phenomena. At the particle level, this explanation shows matter as a combination of ions, atoms, and molecules (Safitri et al., 2019).

B. Learning Results

Every student participating in the study will experience changes in both behavior and other things gained from the learning activities. We refer to these changes as learning outcomes. Once engaged in learning activities, competence will be acquired in the form of learning results. Self-motivation as well as support from the surrounding environment will influence the seriousness of a person's learning goals. If

someone has changed, they are considered to have learned; however, not all changes occur. However, the outcome of the process is the result of learning that achieves a set goal (Muslichatun et al., 2021).

C. Problem-based Learning Model

The problem-based learning approach allows students to "learn how to learn" by working together in groups to solve problems in the real world. These problems cultivate students' curiosity about what is being taught (Maryati,. 2018). Problem-based learning (PBL) is an approach to learning that encourages students to understand the material through interactive questions and answers.

D. iSpring Presenter

According to (Muchtar, et al. 2021), the iSpring program can convert a presentation file to a flash file. People without special expertise can easily use Microsoft PowerPoint. Combining i-Spring and Microsoft PowerPoint can create exciting learning materials. This program allows you to create various types of quizzes, including quizzes with audio, video, and YouTube. Using Flash, Ispring media includes images, animations, audio, and video, as well as presentations and other elements. The benefits of Ispring media will make the learning experience more exciting, leading to increased student engagement, comfort, and enthusiasm.

E. HOTS LITERACY

Critical, logical, reflective, metacognitive, and creative thinking are all Higher Order Thinking Skills (HOTS) (Alviah et al., 2020). HOTS is learning intended to prepare the 21st-century generation to have skills and abilities such as creativity, communication, critical thinking and problem-solving, and thinking processes that involve in-depth understanding as well as critical thought. Science literacy is the ability to associate science with problems and ideas in a reflective society. It is important for students to master science to understand the surrounding environment (Hatimah & Khery, . 2021). Very low science literacy suggests that students have difficulty using science to solve everyday problems, which actually requires a good understanding of science. Very low literacy also indicates that students find it difficult to use their ability to understand many of the problems that arise in everyday life, which indeed requires deep knowledge about science.

METHODS

This type of research is descriptive quantitative using experimental methods with a One-Group Pretest-Posttest Design. This research was carried out at SMA Negeri 8 Medan which is located at Pandau Hulu II, Medan Area District, Medan City, North Sumatra in the even semester of T.A. 2023/2024 which starts in November to December.

RESULT AND DISCUSSION

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	30.57
Posttest	83.71

Based on Table 1. The average result of the pretest value was 30.57 and the posttest was 83.71. The following is a diagram of the average pretest and posttest scores of students' HOTS Literacy skills.

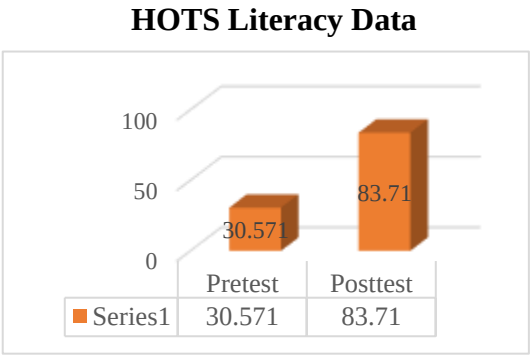

Figure 1. Diagram of the *average value of pretest* and *posttest* HOTS Literacy

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.

Table 2. HOTS Literacy Ability Normality Test Results

Data	X^2_{Count}	X^2_{tables}	Interpretation
Pretest	5.94	11.07	Normal
Posttest	10.60	11.07	Normal

Based on the normality test result table, it is known that *the pretest* data has criteria $X^2_{count} < X^2_{table}$ (5.94 < 11.07) and *posttest* data has criteria $X^2_{count} < X^2_{table}$ (10.60< 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 ofunderstanding of students after being given treatment in the form of learning using the PBL model with iSpring Presenter media. Before being given treatment, a pretest is first carried out by providing a HOTS Literacy instrument to students. The instrument consists of 20 HOTS Literacy questions, eachof which consists of five answer choices (options) with a processing time of 40 minutes. After being given treatment, aposttest was then carried out by giving 20 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
30.57	83.71	35	0.7639	High

Based on the results of the N-gain calculation, it was obtained that there was an increase in student HOT Literacy by 76.39%, 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 $X^2_{count} < X^2_{table}$ 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 Data Normality Test Results

Data	X^2_{Count}	X^2_{tables}	Interpretation
N Gain	9.03	11.07	Normal

Based on the normality test result table, it is known that *N Gain* data has criteria $X^2_{count} < X^2_{table}$ (9.03 < 11.07) So, it was concluded that the N-gain data in this study were normally distributed at asignificant 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 < $-t_{table}$ ½ α and t_{count} > t table ½ α then the alternative hypothesis (Ha) is accepted dan null hypothesis (Ho) is rejected with degrees of freedom (df) = n-1 and α = 0.05 then ½ α =0.025. In this case critical regions are obtained at t < -t(0.025)(34) and t > t(0.025)(34) , 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. Hypothesis Test Analysis Results

Data	X^2_{Count}	X^2_{tables}	Interpretation
Posttest	10.55	- 2.03452 and 2.03452	Ha accepted

Based on the results of the hypothesis test analysis, it was obtained that t count > ttable ½ α, 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 that students'

HOTS Literacy scores are not the same as KKM scores after the application of the PBL model *iSpring Presenter* media in learning.

Based on the scoring of the test instruments given to 35 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

HOTS Literacy Indicator		
C4 Reasoning	**C5 Reasoning**	**C6 Reasoning**
75	84.29	54.29

In this study, as many as five meetings were conducted with face-to-face learning. At the first meeting, students were given pretest of 20 HOTS Literacy questions with indicators of C4 Literacy, C5 Literacy, and C6 Literacy which have been declared valid and can be used. The data from the calculation of the HOTS literacy percentage can be seen in the form of a diagram as follows.

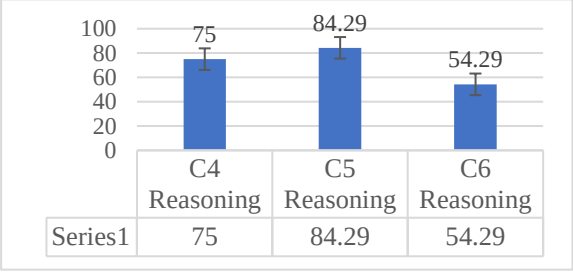

Figure 2. Percentage of HOTS Literacy for Each Indicator

This is done to find out the ability of students' initial HOTS Literacy before being taught using the PBL model with iSpring Presenter media. Furthermore, learning is carried out inclass by applying the PBL model with iSpring Presenter media. It is in line with what has been done (Darma & Achmad, 2018), that a problem-based learning model (PBL) can also enable all students to participate actively in learning and finding solutions to the problems being discussed. It is expected that students' learning outcomes will improve, especially in terms of critical thinking skills. The increase in average student scores also occurred through the application of the PBL model to the literacy of life sciences in research (Dinda et al., 2021). Based on the analysis carried out in the study, the results of iSpring-based learning media development research focused on petroleum materials showed that this tool helps students in independent learning. This media has content supported by images, videos, animations, and questions. The results of the hypothesis test showed that students' learning outcomes with iSpring-based learning media were better than with conventional PowerPoint learning media; thitung values were larger than t_{table} values, i.e. 3.90 greater than 1.999, with a significant gradient = 0.05 and db = 32. In conclusion, Ha accepted. The results showed that students who used iSpring-based learning media had better learning outcomes than students who were using iSspring- based learning media. Based on research carried out (Saraha et al., 2023), which states that the problem-based learning (PBL) model oriented, HOTS is one of the models that can be used. This model is able to emphasize the process of student involvement, which allows students to solve problems and connect them with everyday life (Janah, 2018). The use of HOTS in the learning-teaching process can improve the ability of learners to remember information and expand their knowledge, enabling them to be creative, innovative, and decision-making. In addition, the use of HOTS in the learning-teaching process allows lessons to be stored in student memory longer than using high-level thinking skills. (1) collaboration between teachers, students, and various disciplines; (2) encouraging curiosity, exploration, and

research; (3) a student-centred approach; (4) seeing failure as an opportunity to learn; (5) acknowledging effort, not merely achievement; and (6) a learning-teaching process that integrates with real-world contexts (Apipah & Novaliyosi, 2023).

CONCLUSION

Based on the results of the research, results and discussion that have been described, it is concluded that the HOT Literacy of students who are taught with the PBL model with the iSpring Presenter media on the reaction rate material has increased. To improve students' HOTS literacy skills, especially in chemistry, Educators and prospective teachers can use the PBL model along with iSPring Presenter media. This can be seen through the calculation results in the t-test where $t_{count} > t_{table}$ which is 10.55 > 2.03452 with an N-gain value of 0.7639 or 76.39%. In this study a spec of cognitive HOTS Literacy that was most developed through the PBL model with iSpring Presenter 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 84.29 %,C4 Literacy aspects of 75 %, and C6 Literacy aspects of 54.29%.

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