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Problem-Based Learning Through Outdoor Learning or Conventional Learning: How is it Different for Science Subjects?

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Abstract: The research carried out aims to see how the problem-based learning model with outdoor study influences students' science learning outcomes compared to conventional learning models. The population of this research was 98 students of SMPN 12 Tanjung Jabung Timur, while the sample was 26 students of class VII A and 25 students of class VII B, taken using a purposive sampling technique where class VII A was the experimental class and class VI B as a control class. This research is quantitative research using a quasi-experimental method with non-equivalent control group design. The data collection technique used in this research was a multiple choice test and analyzed using the t-test to see differences in learning outcomes with two different learning models. Based on the results of tests carried out with 20 multiple choice questions, researchers found that there were striking differences in learning outcomes where the average posttest score for experimental class students was 60 while the control class was 39.8, which was then analyzed through paired difference tests (t-test) for looked at the differences and obtained results of 0.000 < 0.05, which means Ha was accepted and H0 was rejected, which can be concluded that there are differences in student learning outcomes who use the problem-based learning model with outdoor study compared to the control class which in this case uses the conventional model. The findings obtained can strengthen evidence that the influence caused by the use of a problem-based learning model with outdoor study on the science learning outcomes of high school students is very good.

INTRODUCTION

The science learning process sometimes always relies on classical learning patterns where students only carry out the learning process in class, but forget that what is being studied is the learning system or material related to the surrounding environment or outside the classroom (Laprise, 2018; Scholz et al., 1997). Biological science learning should be carried out by teachers more outside the classroom because it is an effort that can encourage activeness and better student learning outcomes (Li & Yu, 2022; Rahmawati, 2018; Sripathi et al., 2024). The educational process concerns three dimensions, namely individuals, namely students and teachers in the learning process who have a critical role in the knowledge given and received, then there is the community as observer and control of education so that the material learned is truly beneficial for the community, and the national community is able to become breakthroughs that can be useful for the world of

education as a whole, including material and spiritual realities in order to shape the nature, destiny and form of humans and society that are more qualified and civilized (Usmansyah et al., 2023). In education, there are two main components: educators and students. Educators are individuals who are tasked with educating, guiding and directing students during the educational process. Meanwhile, students are individuals who receive education, guidance and direction from educators to achieve educational goals. The two have a very close relationship, because learning occurs when there is two-way communication between these two components (Ardianti et al., 2021).

Education needs to be improved through various sciences because quality education can form an intelligent nation (Paradina et al., 2019). Quality education can be determined and started from an improvement effort from teachers or teaching staff in creating a learning flow that is truly able to increase students' enthusiasm for learning, one of which is inviting students to learn about a problem and immediately die outside the classroom. (Gray, 2011; Januchta et al., 2022; Sezen & B, 2012). Republic of Indonesia Law no. 20 of 2003 concerning the national education System explains that education is an effort full of awareness and planning to create a learning atmosphere and learning process. Thus, the government continues to revitalize education in Indonesia, especially in the learning process (Melati, 2017). The learning process is said to be effective if it is programmed well, so that students can be more active during learning (Dewi, 2021).

Learning is a collaboration between students, teachers and learning resources in the learning environment. In the current learning process, Indonesian education uses the curriculum merdeka which has been implemented in schools. The curriculum will be the basis for teachers in carrying out learning processes in schools where students will be required to carry out more problem-based learning processes and analyze problems that exist in the surrounding environment (Sawant et al., 2018). The curriculum in Indonesia is often evaluated all the time, even when the Minister of Education is the policy maker and is a good step in making improvements in the world of education and teaching. The curriculum changes according to the needs of society over time and can be an indicator or observation of the limits or extent of the learning process in Indonesia that must be improved, especially at the level of the science learning system in junior high schools (Faadhilah & Indayati, 2023).

The curriculum merdeka in the learning process actually includes two core elements, especially from a science education perspective, namely understanding science and process skills in applying science in everyday life. The curriculum merdeka is a system of freedom in the learning system and is a necessity in the education system during the industrial revolution 4.0. This concept originates from the word "Merdeka" which means freedom and is projected to bring freedom of thought and learning (Faadhilah & Indayati, 202). Science learning is designed to explore and organize activities to support students to understand their environment in more detail. The main focus of science learning is to provide direct learning experiences so that students can explore and understand the natural surroundings through scientific methods.

The research process that researchers observe, especially in natural sciences is a scientific discipline that discusses natural phenomena on a regular basis (Paradina et al.,

2019). Science includes knowledge that studies various natural phenomena, including living creatures and inanimate objects that exist in the natural environment. Based on the results of interviews and observations made, it is known that science learning in the classroom is still dominated by the classical learning model. The learning model used tends to be monotonous and does not reflect the reality of the material being taught. Apart from that, many students have difficulty understanding the material. The learning process is only limited to activities in the classroom, where the teacher only provides information without involving students in direct learning. From the daily test results data, it can be seen that there are still many students in class VIIA and VIIB who have grades in science subjects below the passing standard, where the data shows that of the 98 class VII students, only 38% have reached the passing standard, while 62% of students have not reached the passing standard or in English. Indonesia is abbreviated as KKM (Minimum Completeness Criteria). This certainly shows that a problem-based learning model with a learning system outside the classroom is needed which is believed to be able to increase student activity and learning outcomes.

The science learning process at senior secondary school should be brought to the realm of solving problems. based on the problem. The learning process outside the classroom is a system that researchers consider to be a breakthrough in natural science learning, so implementing learning models such as the problem based learning (PBL) model based on outdoor learning is very important to implement. Several studies have also proven that the application of the outdoor study-based PBL model has a positive effect on student learning outcomes in geography subjects (Mujib et al., 2023), and also shows a significant influence on student learning outcomes (Maulidiyahwarti et al., 2016). Researchers have not found much in natural science learning, especially at high school level, so that it becomes interesting study material to research so that it can become useful and useful input, especially in biology learning which focuses on general natural science material in junior high schools.

METHOD

The research that has been carried out uses a quantitative approach, with the type of research being experimental research with the quasi experimental type. The design used in this research is non-equivalent control group design (Creswell, 2012; Johnston, 2014). The population in this study was the entire class VII of SMPN 12 East Tanjung Jabung in the 2023/2024 academic year, totaling 98 students. The research sample used in this research is a sampling technique using the Purposive Sampling technique, where the researcher takes samples with certain considerations; before the considerations are carried out, the researcher carries out prerequisite tests, namely normality and homogeneity tests, and obtains normal and homogeneous population data, so that the purposive sampling technique can be done. The research also takes into consideration that the teacher who teaches is the same teacher and has a close distance in time, so the research bias that will occur will be small. The consideration process is one of the steps in drawing samples from a population (Sugiyono, 2019), so based on certain considerations, VIIA has 26 students as the experimental class, and VIIB has 25 students as the control class. The data collection

technique in this research uses a pretest-posttest test where the pretest is used to determine the initial condition while the posttest is used to determine the student's final condition. Data collection for both pretest and posttest sed 20 multiple-choice questions. Meanwhile, the data analysis technique used in this research is a hypothesis test (paired sample t-test), which is used to see what differences actually occur in the natural science learning outcomes of students in high school. The data obtained was calculated using SPSS version 26 software and also analysis based on observations and interviews with students directly after the research or test was given.

RESULT AND DISCUSSION

The observations made by researchers in this study focused on the interaction of living things with the environment as learning material. The research focus is used as an effort to make better and more comprehensive observations so that the results of the research carried out can be well controlled (Flórez & Sammons, 2023; Makkonen et al., 2021). This research was carried out in 3 meetings starting on January 12, 2024 until March 23, 2024 where the research was carried out based on the syntax of the problem-based learning model in outdoor form which was used for the experimental class while the conventional model control class intended was the usual learning model or has long been used in schools (Moallem et al., 2019; Nofriadi & Yestin, 2022).

Learning with a problem-based learning model accompanied by learning outside the classroom provides a view of learning outcomes that are influenced by a system based on environmental problems. This study uses a good test before providing treatment with a problem-based learning model based on outdoor study. The test questions given previously were analyzed for logistic validity, namely considering asking experts and also conducting empirical validity with the aim of obtaining questions that fall into the category of validity, reliability, difficulty index and question discrimination. The results of logistic validity and parameters of 50 questions in the multiple-choice exam used as research instruments obtained 22 that were used. After the learning process was carried out both in the experimental class, namely class VII A students and also the control class in class VII B, information was obtained that student learning outcomes in natural science material in the control class were much better than in the experimental class. The data on student learning outcomes can be seen in Table 1.

Table 1. Data Analysis and Descriptive Statistics

Focus Research	Mean	N	Std. Deviation	Std. Error Mean
Pretest Experiment	45.19	26	8.998	1.765
Posttest Experiment	75.38	26	6.152	1.206
Pretest Control	39.80	25	8.718	1.744
Posttest Control	60.00	25	9.574	1.915

The results of the study in Table 1 clearly show that in the initial test, both the experimental and control classes did not experience a striking difference where the initial test score in the experimental class was 45.19 while in the control class it was 39.80, then after being given treatment and conducting a final test, it is clear that there is a significant difference in value between the experimental class and the control class, where the

student's score in the experimental class was 75.38 while the control class was 60.00. If the results of the analysis are reviewed more deeply, perhaps the initial factor of the student dominates the student's ability towards learning outcomes, so a more in-depth analysis is still needed to understand the student's ability. As for the Graph of the Average Value and Standard Deviation of the Experimental Class, it can be seen in Figure 1.

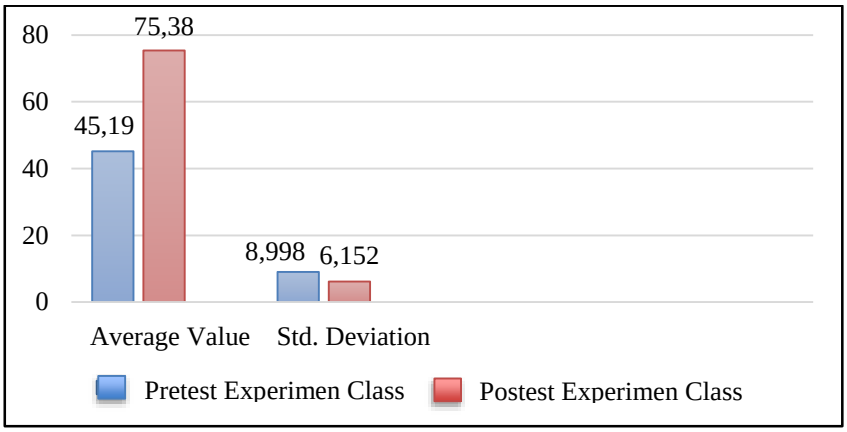

Figure 1. Graph of Mean Value and Standard Deviation of Experimental Class

The results of the study In Table 1 it is shown that the average value of students in the experimental class at the time of the final test is much greater than the average value of the experimental class at the time of the initial test before being given treatment, where the experimental class for the final test has an average value of 75.38. Meanwhile, in the experimental class also before the treatment was given, it had an average pretest value of 45.19. In line with that, viewed from the standard deviation where the standard deviation of the experimental class during the pretest was slightly further away from the average, which was 8.998, while at the time of the posttest the experimental class had a standard deviation that was close to the average, which was 6.152. If it happens from the KKM value of students for the Natural Sciences subject set by the school, which is 75, then for the posttest analysis of student information in the experimental class it was obtained that there were 18 students out of 26 students in the experimental class who managed to achieve the KKM. For data analysis in the control class, see Figure 2.

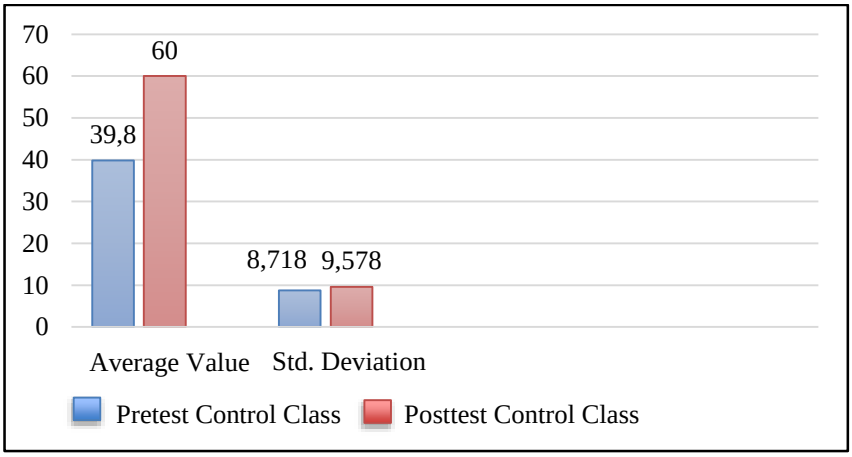

Figure 2. Graph of Mean Value and Standard Deviation of Control Class

Changes in student learning outcomes are clearly visible when compared to the control class as seen in Figure 2, where both during the initial test and the final test the increase in learning outcomes tends to always be below the average value of experimental class student learning outcomes. The learning outcome score of control class students during the pretest was 39.8, in other words, very low, as well as during the posttest where the average score of control class students was 60. The students' average score was 60, indicating that the average was not there are students who have completed or fulfilled the KKM. If you look at the standard deviation during the pre-test in the control class it was 8.718 and far from the post-test, namely 9.578, in other words the average student score was far from the average score which could be an indication. that there are students who have grades that are very far from below average grades. This condition proves that learning carried out using the conventional model does not provide maximum contribution to student learning outcomes.

The results of the data analysis showed that the problem-based learning model based on outdoor study affected student learning outcomes in class VII science subjects at SMPN 12 Tanjung Jabung Timur with high category significance. This is because students feel comfortable and better understand the material provided by providing direct learning experiences (outdoor study) with learning resources, and students ultimately have enthusiasm and high curiosity. Through outdoor research, students learn not only from what they hear but also from what they see and do. This model includes all five senses and motor aspects of students and also uses the environment as a learning resource to link lesson concepts with the actual conditions around them (Usmansyah et al., 2023). Learning in the experimental class implemented a problem-based learning model based on outdoor study. In contrast, in the control class, which implemented conventional methods, significant differences were found in learning outcomes, where the model positively influenced the average learning outcomes in the experimental class. Problem-based learning through outdoor study has a significant effect on student learning outcomes (Maulidiyahwarti et al., 2016), and in this study it was proven by the difference in pretest and posttest scores between the experimental class and the control class where the experimental class was better and more positive towards learning outcomes.

Impact Analysis of Problem-Based Learning Through Outdoor Learning

The research process that has been carried out has obtained various data and facts about the outdoor assisted problem based learning model, which is supported by field observations and it was found that in teaching and learning activities the learning process takes place using a contextual approach which is carried out outside the classroom. Contextual learning can support student development and focus in the learning process (Eleknaviciute et al., 2023; Parija, Subhash Chandra; Kate, 2018; Trueman, 2014), students will be challenged in solving problems. Students outside the classroom will be individuals who are able to solve questions both by providing solutions based on the theory that has been given and also providing answers from analysis directly outside of class. Direct student analysis outside of class can encourage the creation of independence and increase

students' self-confidence in deciding on an answer and this can increase students' understanding indirectly (Ahmad, 2013; Patall et al., 2017).

Then students are grouped or organized students to learn by utilizing nature or the environment. The grouping of students is intended so that students are able to share information or knowledge in resolving the problems they are currently facing (Giesen & Roeser, 2020; Koseoglu & Doering, 2011),with Guide independent and group investigations which will later serve as a tool to focus students in analyzing the material being studied. The results of the analysis must be presented or displayed the results of the work to increase student self-confidence and ends with an analysis process. Analyze and evaluate the problem solving process provided whether it is correct or not. The assessment process is also an important instrument in the process of forming student understanding. The treatment given during the research process uses more detailed and orderly stages. In an effort to maintain order in the learning process, teachers comply with the latest regulations in learning, namely using an curriculum merdeka. An curriculum merdeka can provide and help both teachers and students to have more freedom in studying or understanding subject matter (Pamuji & Mawardi, 2023). The learning process is carried out with the help of student worksheets which in Indonesian are abbreviated as LKPD. The learning process will proceed well if the references given by the teacher to students are clear and easy to understand well, each reference must have meaning according to the material presented (Rusli et al., 2023; Sungur et al., 2006). Teachers use LKPD as a tool to direct and also provide students with an understanding of the material presented.

The research was carried out by carrying out all the implementation processes based on the steps or syntax of the problem-based learning model through outdoor learning, where in the first stage students were divided into 4 groups. The division of groups in learning is a hope for teachers to create a better and more enjoyable learning atmosphere (Daryanes et al., 2023; Gray, 2011). A good and enjoyable learning atmosphere can encourage optimal student learning activities where each student can contribute to solving the problems being discussed. The discussion process will provide an opportunity for students to exchange ideas in synthesizing the problems being faced. The discussion process will run well if there is a learning system that regulates the learning pattern where there must be several arguments from each student in responding to the problems or issues given by the teacher. This study provides an illustration that each child and individual during the learning process provides input and suggestions for the learning that is carried out. Students in the implementation of learning are always open and enthusiastic by combining the theories they have with the practices they do. Students will participate especially when they believe that the theory and the point of view of real conditions are appropriate. The ability of discussion provides a role for students to find student confidence in the learning process that is carried out

Student contributions, no matter how small, have a big impact on the learning outcomes they produce. Students will provide views according to their understanding and the teacher will correct these views if a misunderstanding occurs. Providing problems is very important before the discussion process is given, because the right problems can

encourage students to become better and more enthusiastic in understanding the teaching material. In this research, the problems given by researchers can be seen in Figure 3.

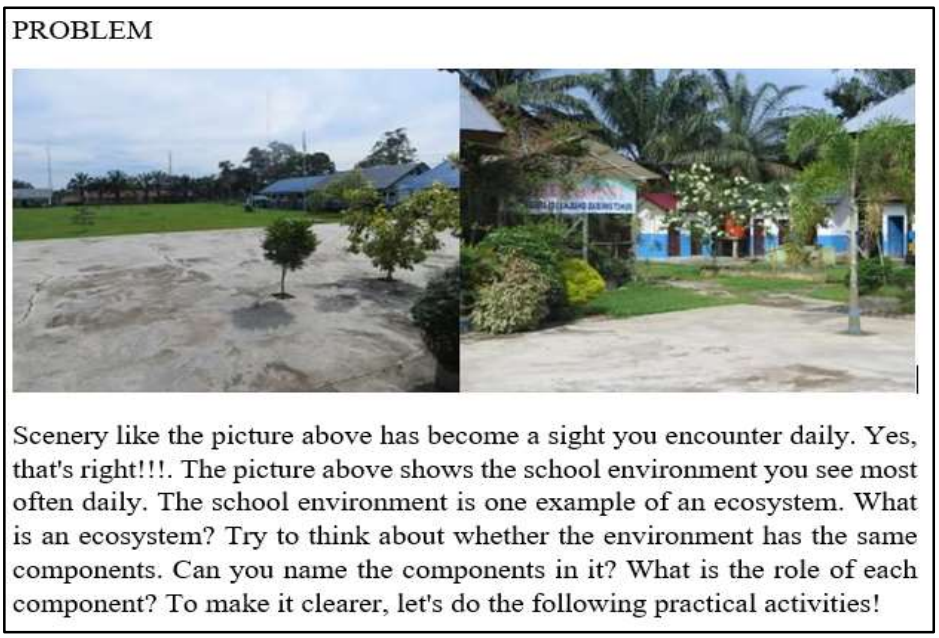

Figure 3. Giving Problems Outside the Classroom

The division into groups is made on a heterogeneous basis so that students' abilities vary in each group, with the aim being that there is an exchange of information provided during group activities in learning or solving problems (Iancu, 2014; Putri et al., 2022). Each group is given a LKPD, then students are guided to read the LKPD, and pay attention to environmental problems around the school which are correlated with material on the interaction of living things with the environment. Students will think about problems on the LKPD. This indicates that students have entered the first stage, namely orienting students to the problem. Student orientation to the problem is the beginning of activating the way students think about the problems given. This ability provides an illustration that students will be required to begin to understand the problems faced either by using learning theories or the results of their observations and all must be combined and form a new system of understanding that is appropriate and relevant to the ongoing theory and the analysis given is correct and can be accounted for properly.

The goal of Problem Based Learning is to increase students' learning independence and social skills. The purpose of Problem Based Learning is to improve students' learning independence and social skills. Independence plays an important role in shaping students' character that is able to develop and compete in global competition. Independence is a pattern of behavior that results from the learning process, one of which is based on problems or experiences that someone finds in their life. Independence allows individuals to move more courageously and effectively as well as with mature calculations and analysis. This independence and social skills are created when students work together to obtain relevant information, strategies and learning resources to solve problems (Sofyan et al., 2017). Observations related to the problems contained in the LKPD were carried out

by utilizing the school environment by inviting students outside the classroom (outdoor study). The analysis of students in solving problems in groups can be seen in Figure 4.

Figure 4. Students analyze problems outside the classroom

The process of students analyzing a problem outside the classroom as in Figure 4, makes students have the ability to better understand learning in a more relaxed and casual way which is usually done in the classroom and is now done outside the classroom. Learning outside the classroom provides a new atmosphere for students to learn and find solutions to a problem they face. Learning outside the classroom can provide students with the attraction and enthusiasm in the process of analyzing and describing problems in their learning.The learning process continues with the teacher's efforts to explore independently and in groups, with outdoor study-based learning. In this method, students observe the natural, social, economic and cultural conditions around the school and try to analyze both theoretically and the facts they find during direct observation outside the classroom. The results obtained will be an accurate conclusion that can be accounted for by students, in other words learning does not just transfer knowledge from teacher to student, but also allows students to feel, observe, find and conclude the results of observations independently (Ermawati & Arisona, 2021).

The process is then carried out at the development and presentation stages of the work. Each group will present the results of the LKPD along with the responses of other groups and the teacher will provide reinforcement. After all groups have finished presenting, the group will know a new concept or new understanding from the results of the independent analysis that they have done. Students in presenting the results of their understanding are expected to be able to provide a more comprehensive picture or explanation by combining the theory they have obtained with the reality analyzed outside the classroom so that the conclusions drawn can be understood as absolute truths.Presentation of work is an important part in increasing students' enthusiasm for learning, students will be more active and creative in explaining the results of their findings in the field which can make students more enthusiastic and confident in the results of their findings or solutions to problems they themselves experience. The student's stages of solving it can be seen in Figure 5.

Figure 5. Students present the solutions and findings obtained

The stage process in implementing the problem-based learning model in the form of learning outside the classroom continues with the final stage, namely analysis from the teacher. In this section the teacher not only acts as a grader but also as a student guide in the learning process where the teacher will try to analyze the student's answers and direct the answers if they feel they are not correct or appropriate. In this research, the teacher is positioned as a facilitator who is able to facilitate students' deficiencies or interests in understanding the learning material (Puspitasari et al., 2020; Sezen & B, 2012). Students in the final stage carry out assessments by comparing student assessments both with the problem-based learning model through outdoor learning and also with conventional learning and the results shown clearly provide the meaning that student learning is able to encourage students to be more active and enthusiastic in understanding the current learning material. studied. Student activity in the learning process can increase students' ability to understand more material, as well as provide student focus in the learning process. Focus is needed by students to digest and analyze learning. Through good focus, the given problem can be digested well before a solution or decision is taken, so that the decision taken is a decision from a view and thinking pattern that is truly careful and measurable.

CONCLUSION

The research process that has been carried out has obtained several vital facts regarding the theory that researchers analyze and build and findings directly in the field. Also, based on the data analysis researchers have done, there is a difference in student learning outcomes in natural science material through problem-based learning models based on an outdoor study on student learning outcomes in conventional classes. This is evidenced by the results of the t-test using a paired sample t-test of 0.000> 0.05, which shows that Ha is accepted and Hi is rejected, which indicates a difference in student learning outcomes. Student learning outcomes using the problem-based problem-based learning model based on outdoor study obtained an average posttest score of 75.38 and a standard deviation of 6.152, where the individual student scores are close to their average value on average. Then, in the control class using the problem-based learning model based

on outdoor study, the average posttest score was 60.00, and the standard deviation was 9.574, indicating that the average score of individual students was far from the average score of their class group, in other words, it is likely that students in the control class with the conventional model have minimal scores and are far below the average score. The analysis of the hypothesis test with this t-test can be considered that the influence of the model given causes the differences that occur, so it can also be concluded that the problem-based learning model based on outdoor study has an excellent impact on the learning outcomes of students' natural sciences at the high school level. The researcher hopes that other researchers in the future will try to explore more and determine the analysis for material outside the classroom that is more problematic and oriented towards local culture so that it can provide additional regulation and introduce local culture to students.

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