Project-based learning model
for strengthening elementary school students' creativity in science

Muhammad Maskur Musa* and Rahmat Kamal
State Islamic University of K.H. Abdurrahman Wahid Pekalongan, Indonesia
*Email: muhammadmaskurmusa@mhs.uingusdur.ac.id

Abstract: This research aimed to explain a project-based learning model for strengthening elementary school students' creativity in science. The research uses field studies or field research with a descriptive-qualitative approach. Data collection techniques use observation, interviews, and documentation, which are then analyzed using data condensation techniques, data presentation, and drawing conclusions. The results of the research explain that the implementation of the project-based learning model in science in class 4 consists of three stages, including the planning stage and the implementation stage, which include providing basic questions, creating a project design, preparing an activity schedule; project implementation and monitoring; assessment of project results; evaluation of learning experience; and the evaluation stage. The embedded creativity attitudes include students' imaginations emerging when creating projects; the more significant the students' curiosity, daring to take risks, being easier to adapt to the surrounding environment, increasing student independence, and instilling patience and tenacity in students. Supporting and inhibiting factors that influence the implementation of a project-based learning model come from the school, students, and parents.

Keywords: *project-based learning, IPAS, creativity*

INTRODUCTION

The learning process is a series of interactions between two human elements: students as those who learn and teachers as those who teach, with students as the main subject (Yuristia, Hidayati, & Ratih, 2022). The learning process is not an activity in the sense of conveying academic knowledge, theories, and facts. More than that, the learning process is an activity that must be able to facilitate students' activities in developing their competencies so that they have life skills for life and livelihood as independent human beings (Chang et al., 2023).

The learning applied in Indonesian education is still unable to form student competencies fully. Because the learning that is carried out is still dominated by teachers and books in conveying knowledge, or what is usually called teacher-centered learning, it is assumed that the knowledge teachers have and that is in books is the most correct. As a result, students' knowledge gained from daily life experiences outside of school is given less attention and respect in the educational environment (Dewi et al., 2021). Seeing conditions like this results in the learning process carried out in schools not

being creative, not seeming to involve students' feelings and emotions, not being original, and tending to be artificial and full of coercion.

A learning process that makes students not develop, students' creativity not increase, students feel bored, and students are not enthusiastic about learning must be changed immediately. Considering the increasingly rapid development of technology, not only is the knowledge needed but it must be balanced with the skills that students have within themselves. Even good learning now emphasizes student skills rather than student knowledge (Fajaruddin, 2022). Because these skills will be helpful in students' lives when facing current developments. To make this happen, teachers need to make efforts in learning; one of these efforts is realized through the learning model teachers use in the learning process. The learning model in the learning process determines the expected conditions and atmosphere of the class and determines student success in the teaching and learning process (Kristansi et al., 2021). Teachers can use many forms of learning models in the learning process. However, in their application, the teacher must adapt to the conditions and situation of the class and the characteristics of the students being taught.

The learning process in the classroom is an interactive activity between the teacher and students. This interaction occurs when the teacher delivers material, conducts questions and answers, or carries out discussions in class (Mulyati, 2023). Teachers need to design learning through a learning model for this interaction to realise a learning goal. Therefore, teachers must be able to master various teaching skills to be considered professional teachers in their field. These abilities include teaching methods, mastering the material being taught, choosing various teaching models, creating teaching tools or media, attitudes, being a role model, and so on (Amelia et al., 2023).

The role of a teacher in the learning process must be understood within himself so that the teacher can achieve the desired goals in delivering the material. To understand their role as teachers, teachers must have several competencies within themselves. According to Rusman's research, teachers must have four competencies to understand their role: 1) the ability to manage student learning, including understanding, designing, and implementing learning, or what is usually called pedagogical competence. 2) Personal competence is a personality trait characterized by stability, steadiness, maturity, wisdom, and authority; it also serves as a role model for students and is characterized by a high moral code. Professional competence, or the ability to thoroughly understand the material being studied, enables instructors to help students meet competency criteria. 4) Social competence refers to a teacher's capacity to connect and communicate successfully with students, other educators, students' guardians, and members of society at large (Nur & Fatonah, 2022).

A teacher who has these four competencies can effectively achieve learning goals and create a conducive and enjoyable learning environment for students. Mastery of the four competencies within a teacher also determines whether the learning model can achieve learning objectives. Therefore, this requires teachers to carry out self-evaluation in teaching and improve learning practices in the classroom through the model used. The evaluation

and improvement results are obtained using the project-based learning (PjBL) model (Sadikin & Yelianti, 2021). PjBL is a learning model where the learning process produces a particular project by directly involving students. This learning model fosters greater problem-solving abilities through completing a project. Students can use the PjBL model to decide on topics, conduct research, and complete specific projects. Through the use of projects as learning models, all students can work in the real world and produce realistic products (Situmorang et al., 2022). Perayani and Rasna (2021) explained in their research that the characteristics of the project-based learning model are used to guide the implementation of learning scenarios, but several elements are still missing, such as important questions that must be completed before other activities. Learning evaluation practices follow the principles of the project-based learning framework. Question instructions and possible score ranges for test items are two things that teachers still seem to miss (Perayani & Rasna, 2021). Meanwhile, according to Farida and Suprihatiningsih (2022), compared to the direct learning model, the PjBL learning model provides better results for student learning outcomes in the Numerical Methods course of the Informatics Engineering Study Program. Thus, it can be concluded that, when compared with the direct learning model, using the PjBL learning model is more effective in evaluating student project assignments in the Informatics Engineering Study Program, FIKOM, Duta Bangsa University, Surakarta. Based on these conclusions, the benefits of this research include the fact that lecturers already know the appropriate learning models to use during the pandemic. It turns out that the PjBL approach allows for independent learning and fosters student creativity when working on projects assigned by lecturers (Farida & Suprihatiningsih, 2022).

Yanti and Novaliyosi (2023) also explained that in mathematics learning, the PjBL learning model positively affects the development of hard and soft skills at the elementary, middle, and high school/vocational school levels. PjBL has been proven to improve critical thinking skills and learning motivation in elementary schools, increase creative thinking skills and learning motivation in secondary schools, and increase students' learning motivation and interest in learning in secondary schools. The three studies above explain that the PjBL model in the learning process can develop students' soft skills, and this model also provides more enthusiasm and motivation to students than other models (Yanti & Novaliyosi, 2023). However, for this research, the researcher conducted research on instilling students' creative attitudes through the PjBL model in science and science subjects at Ibtidaiyah madrasas, where the focus of the research was to explain the implementation of the PjBL model in science and science subjects at Ibtidaiyah madrasas, the creativity attitudes embedded in students, and supporting factors. and obstacles to the implementation of the PjBL model in science and science subjects at Madrasah Ibtidaiyah.

The project-based learning model is a learning model that educators can use in various subjects, but this learning model is often used in natural sciences subjects. Science subjects are subjects that aim to discover and know a body of knowledge consisting of facts, concepts, or principles (Wardah et al., 2022). Natural Sciences (IPA/Ilmu Pengetahuan

Alam) is concerned with learning about nature methodically. As a result, students have the opportunity to conduct experiments during the science learning process to determine the truth of a fact or concept from the material they are studying. This gives students the knowledge and skills they need to observe, evaluate, and draw conclusions from objects, as well as write about situations or processes. Science subjects in Indonesian education are included in the KTSP and 2013 curriculum (K13) (Abdurahman et al., 2022).

Indonesian education is now starting to use an independent learning curriculum where science subjects have changed to IPAS (Ilmu Pengetahuan Alam dan Sosial/natural and social sciences), combining natural and social knowledge in learning. So, science and science are two subjects that are combined into one: science and social studies (Muslim, 2022). These two subjects in the learning process require students to be able to produce a product from the material they have studied. The products here are not only in the form of objects, but students also produce products in the form of their abilities. For example, in science subjects, many products can be produced from each material taught and studied, such as human blood circulation. Students can make a product in the form of a description of the human blood circulation process using materials that are easily available to them. Then, in the grafting material, students can also be invited out of class to see the correct grafting process; then, students practice grafting directly, and the results of the graft are the products produced in this material as well as many other materials (Junia & Sujana, 2023).

Then, in social studies subjects, students can produce products according to their abilities after studying certain material. For example, students can practice activities in the market so that they can become sellers and buyers, learn how to make good transactions, and develop other abilities. Seeing this shows that science subjects are subjects that require students to have creativity within themselves. Therefore, science and science subjects require a learning model that is capable of increasing student creativity. One model that teachers can use is the project-based learning model (Hidayati & Restian, 2023).

Based on the background, this problem also occurs at MIN (Madrasah et al./elementary school) Pekalongan, especially in class 4, where the learning process is still conventional and dominated by teachers. This is what causes the learning that is carried out to not touch the student dimension because students here are only recipients of the information provided by the teacher. This means that students' skills do not improve, which means that their attitude toward creativity cannot be ingrained in them. Seeing this, the class 4 teacher made learning improvements by implementing the project-based learning model. The project-based learning model is a learning model that has been well implemented at MIN Pekalongan, especially in class 4 in science learning. This is based on what was conveyed by the class 4 teacher: that the PjBL model can increase student motivation and enthusiasm for learning so that the learning outcomes carried out by students are better than before. This is shown by the students' good work results. Furthermore, the PjBL model is also a solution to make students more independent and act as more mature people, which can help students develop their potential and abilities. Increasing the potential and ability to create a creative attitude

towards something is embedded in students. This form of creativity is shown in making projects in the learning process. These projects in learning have been done by class 4 of MIN Pekalongan in the form of creativity in cutting and grafting plants, and students can make local food (Khasanah, 2023).

Therefore, researchers are interested in highlighting and studying research entitled "Implementation of Project Based Learning in the Independent Learning Curriculum in Science and Science Subjects to Instill Creativity in Class 4 Students of MIN Pekalongan".

METHOD

This research uses a type of field study research. This research is a type of qualitative research where researchers directly obtain information in the form of data originating from the field in the form of realizations of social life in society (Sari *et al.*, 2022). For the approach, the researcher used descriptive qualitative to explain research on the implementation of project-based learning in the independent learning curriculum in science and science subjects to instill an attitude of creativity in grade 4 students at MIN Pekalongan, with primary data sources, namely, class 4 homeroom teachers and grade 4 students at MIN Pekalongan and data sources. Secondary in the form of books, journal articles, and other scientific papers relevant to the title of this research.

Researchers collected data using three techniques: observation, interviews, and documentation. The researcher's observation technique observed the process of implementing science and science learning using the project-based learning model, guided by the observation instruments that had been created. After observing, the researcher continued collecting data in more depth through interviews. In the interview activity, the researcher interviewed primary data sources, namely the class 4 homeroom teacher and class 4 students of MIN Pekalongan, to ask for data that had not been obtained during observation in the form of implementation of learning activities and data in the form of creativity attitudes that had been embedded in class 4 students of MIN Pekalongan. Then the last technique used by researchers is documentation. Here, the researcher documents learning activities and asks for school documents to support this research.

After the researcher had carried out the data collection, the researcher continued processing the data through data analysis. Researchers used three data analysis techniques, namely, data condensation, data presentation, and conclusion. In the first stage, researchers reduce the amount of data by carefully selecting data through observation, interviews, and documentation. Next, the researcher organizes the data that has been collected to make it easier to present. The data that has been collected, reduced, and then presented descriptively is what catches the researcher's attention. In the final stage of analysis, the researcher presents arguments and conclusions based on the conclusions drawn from the data that has been provided.

FINDINGS AND DISCUSSION

After the researcher conducted the research, then obtained several research results that were the focus of his research. The results of this research can be seen in Table 1, 2, and 3.

Table 1
Implementation of the PjBL Model in MIN Pekalongan Class 4 Science and Technology

Stages	Activity
Planning	1. Identify learning materials 2. Create a teaching module 3. Communicate teaching modules or learning planning to students
Implementation	1. Ask basic questions 2. Create a project design 3. Prepare an activity schedule 4. Project implementation and monitoring 5. Assessment of project results 6. Evaluate the learning experience
Evaluation	1. Teacher reflection in implementing the PjBL model to find out the advantages and disadvantages during implementation. 2. The results in the assessment stage are carried out by the teacher to assess the student's process of completing the project, and the results of the project are created. 3. This experience evaluation stage is carried out by the teacher to ask questions and find out students' experiences in carrying out project-based learning. 4. Tests to determine students' cognitive levels, then students' affective levels through observation sheets, and skills through performance results from making projects.

Table 2
The creative attitude embedded in grade 4 students at MIN Pekalongan

Creativity Attitude
1. Students imaginations emerge
2. Students' curiosity about everything becomes stronger
3. Dare to take risks
4. Becomes easy to adapt to the surrounding environment
5. Growing independence in students
6. Instill patience and tenacity in students

Table 3
Supporting and inhibiting factors for implementing the PjBL model

Supporting factors	Obstacle factor
1. The school supports and advises all teachers to use creative models that are student-centered. 2. Students are more enthusiastic about participating in the learning process using the PjBL model, so motivation to learn increases. 3. Parents are very enthusiastic and support their children in making a product and learning new skills.	1. Some students still lack communication and self-confidence when forming groups, and many students want to be in a group with their close friends. 2. The time required for the PjBL model requires a lot of time, and some projects even require a long time. 3. Implementing projects in the form of planting plants, this Project Based Learning model requires land.

Implementation of Project-Based Learning in Science and Technology Subjects in Class 4 MIN Pekalongan. The learning model is used as a way to carry out learning process activities and plays a very important role in achieving goals. So, teachers' selection and use of learning models must be taken into account. There are many kinds of learning models that teachers can apply in the learning process, especially innovative and creative learning models. However, when selecting a model, teachers must adapt it to the learning material and characteristics of the students. The model used must be able to actively involve students in learning and provide students with more experience during the learning process (Audia & Hidayat, 2023). In MIN Pekalongan itself, especially in grade 4, especially in science and science subjects, the homeroom teacher often uses a learning model that is innovative, creative, actively involves students, and provides students with more experience. This model is the project-based learning model. The project-based learning model in its implementation in class 4 of MIN Pekalongan in the science subject has several stages, such as planning, implementation, and evaluation.

Planning stage: Planning is an important first step in implementing a model (Homayuni & Hosseini, 2023). So that this PjBL model can be implemented smoothly and well and achieve the expected goals. The planning was carried out by the science subject teacher as well as the homeroom teacher for class 4 of MIN Pekalongan implementation.

the PjBL model includes identifying the material to be taught so that the model to be implemented is appropriate to that material. After that, the class 4 teacher created a teaching module. This module contained learning outcomes, learning objectives, learning indicators, learning media and teaching materials, models used, learning steps, and assessment. The planning in the form of making this teaching module was made by the science teacher and class 4 teacher at MIN Pekalongan one week before the implementation of the PjBL model, and the creation of the module took place at the madrasah office. The process of creating this teaching module also involves all class 4 guardians because, at MIN Pekalongan, class 4 consists of 3 classes, namely 4A, 4B, and 4C. After creating the teaching module, the next plan carried out by the science teacher and class 4 homeroom teacher is to communicate it to students. This aims to ensure that students understand the learning process that will be carried out and that the desired goals can be achieved. The teacher communicates with students when they want to start implementing the PjBL model (Baptist et al., 2020). In the implementation stage, the project-based learning model, of course, the implementation of the learning process, has several steps or syntax. This is a guideline for the class 4 MIN Pekalongan homeroom teacher as well as the science subject teacher in implementing the PjBL model.

The implementation of the PjBL model in science subjects in class 4, both 4A, 4B, and 4C, MIN Pekalongan, consists of several steps of learning syntax. *First*, providing basic questions. The initial step of learning with the PjBL model is providing basic questions, namely questions. that can give assignments to students in the activities carried out. Assignment topics are adjusted to realities that are relevant to students and begin with an in-depth investigation. In class 4A, the application of the PjBL model was carried out in the planting and grafting project. The teacher gave students stimulating questions to

stimulate their thinking. In class 4A, during the project on planting chili plants, students were asked questions about the origins of chili plants, how they grow, and the process of reproduction and growth. Likewise, when making savings crafts, the teacher starts with basic questions to spark students. The teacher asks several questions about saving, such as whether students like to save, where they like to save, and other questions (Ambiyar et al., 2020).

Second, when creating a project design, teachers and students collaboratively plan the project so that students feel ownership of the project that will be created. Project planning is like the rules of the game: the activities selected to support answering essential questions by integrating various possible subjects, as well as knowing the tools and materials that are easily accessible to help complete the project. In class 4, in projects for planting plants, grafting, using waste, making crafts, and so on, the teacher designs the project plans collaboratively with both the class 4 homeroom teacher and the students. This collaborative form of planning is first carried out by determining the activities to be carried out, such as the project to be created and the materials and tools needed for the project. Collaborative forms are also carried out in terms of game rules, such as the steps in completing a project.

Third, develop an activity schedule. Preparing the activity schedule for completing the project is carried out collaboratively between teachers and students. This stage consists of various activities, including making a timeline (time allocation) for completing the project, making a deadline (final deadline) for completing the project, inviting students to plan a new way, directing students when making a way that is not appropriate and has no connection with the project, and asking students to make an explanation in the form of reasons for selecting the project. After planning the project in class 4A, the students and the homeroom teacher create a project activity schedule. At this stage of preparing the schedule, when carrying out a project in class 4, the teacher determines the time needed to complete the project. In grade 4, completing a project usually takes approximately three days. Except for the project of planting chili plants, the project takes quite a long time to see the results of the chili plants, but the process of planting the seeds only takes one day.

Fourth, project implementation and monitoring Monitoring is the teacher's responsibility for student activities during project completion. Monitoring is carried out by providing student facilities in each process. In other words, the teacher plays the role of mentor or facilitator for student activities. To make the monitoring process easier, a rubric was created that can record all important student activities. According to the researcher's observations in the field, monitoring was carried out directly by the class 4 teacher when carrying out the project. The teacher sees and accompanies the students in completing the project, especially here, where the teacher has a role as a facilitator. When students experience difficulties or problems in completing the project, the teacher provides direction or prompts the students again, not teaching them. The form of monitoring in class 4 carried out by the teacher also aims to see the activity of each student in each project group and the group's cooperation in completing it because making this project will not only be assessed for the project but also the process that students carry out when completing the project. Monitoring is also carried out to see the progress of the projects made by each group.

Fifth, assessment of project results. Assessment is carried out to help teachers measure standards, play a role in evaluating each student's progress, provide feedback on the level of understanding students have achieved, and help teachers develop subsequent learning strategies. Assessing the results that researchers saw in field observations, teachers carried out direct observations during the project creation process. This is because the implementation of this project is assessed not only by the results of the project but also by the students' process when completing the project. This results assessment is not only used to assess students but also by teachers to reflect on project activities that have been carried out. This aims to identify deficiencies that occur during the project activity process and also assist teachers in determining further learning strategies.

Sixth, evaluation of learning experiences. Project-based learning activities are certainly different from learning carried out using the usual model. This project activity certainly involves students directly in the learning process. This student involvement occurs because, in project-based activities, there are projects created directly by students in groups. So, this project-based learning activity provides students with experience in the learning process. In making a project, of course, there is experience gained by students; this needs to be evaluated by the teacher to find out the experience gained by students during the process of making the project. The form of experience evaluation activity in class 4 in the project creation process is carried out after the project is completed. Here, the teacher directly asks one by one about the experiences gained by students during the manufacturing process. On average, most students feel more enthusiastic about carrying out project-based learning compared to other learning. It can be seen that during the project creation process, most students are active and work together with each other in their group; this can only be seen when learning is project-based.

Evaluation stage: Evaluation is the final stage of implementing the PjBL model. This evaluation aims to measure the level of understanding, skills, and attitudes students gain during the learning process. Evaluation is also used as a teacher's reflection in implementing the PjBL model to determine the advantages and disadvantages during implementation. The homeroom teacher for class 4 at MIN Pekalongan, in evaluating the learning process, uses an assessment of students' knowledge, skills, and attitudes. Apart from assessment for students, evaluation is also used by teachers as a reflection when implementing the PjBL model in the learning process. This is to see the achievement of the expected learning objectives and the shortcomings that occur in implementing the PjBL model. It is used to determine the learning model in the next teaching and learning activity so that the learning process is better than before. In the PjBL model, there are also stages of result assessment and experience evaluation. This results assessment stage is carried out by the teacher to assess the student's process in completing the project and the results of the project created.

Meanwhile, the experience evaluation stage is carried out by the teacher to ask questions and find out students' experiences in carrying out project-based learning. The evaluation of this experience in class 4 MIN Pekalongan was carried out after the project creation process was complete. The students were asked, either one by one or by group representatives, what experiences they had while carrying out the project. The homeroom

teacher for class 4A, MIN Pekalongan, uses several forms of assessment in the learning process, including tests to determine students' cognitive levels, then students' affective levels through observation sheets, and skills through performance results from making projects.

Attitudes of Creativity Instilled in Class 4 Students of MIN Pekalongan through Project-Based Learning in Science Subjects. The project-based learning model applied to science and science subjects certainly provides something new in the learning process in class 4 of MIN Pekalongan. This is shown by the condition of students' participation in the learning. Researchers say that when observing in the field, students looked more enthusiastic and motivated to participate in learning, unlike learning using other learning models. This was also said directly by class 4 students in their interviews: when learning science and technology with projects, they were more enthusiastic and motivated. The enthusiasm and motivation of these students in learning means that the expected learning process, namely learning that involves students and is meaningful, can be realized, so that students can improve their competencies through their creativity. This PjBL model is one way to instill a creative attitude in students. This has been proven in class 4 of MIN Pekalongan, which has implemented the PjBL model in science subjects and can instill student creativity. There are several characteristics and indicators of creativity that have been embedded in students (Thongsri & Susilowati, 2021).

First, students' imagination emerges. This can be seen when students carry out several projects, such as planting chili plants and grafting activities, holding a food bazaar based on observations made by previous sellers, where the food is made by themselves according to the imagination of each group, and making crafts from used items. The teacher gives students the freedom to make any craft with a good model according to the group's wishes, so this allows students to come up with their creative ideas.

Second, students' curiosity about everything is getting stronger. This is by what was conveyed directly by grade 4 students, namely that this curiosity made them often ask questions when learning science and other lessons. This curiosity can be seen when doing projects, too; students want to know about projects from other groups. When you see another group doing a good project, you want to make something better than the other group.

Third, be brave in taking risks. Taking risks certainly requires courage from students. This courage is shown through simple things first. This includes being able to provide ideas and suggestions for problems that occur around them, often answering questions given by the teacher, and expressing opinions spontaneously without feeling embarrassed, both when learning science and other lessons. The next form of student courage in taking risks was when a grade 4 student from one of the groups at that time called his friends from the same group to his house to carry out a project in the form of making donuts. The teacher has not ordered the students to do this project, but one of the groups has dared to take the risk of doing a project to make donuts at home. So that when the teacher carries out the project, he can put it into practice.

Fourth, being able to easily adapt to the surrounding environment, MIN Pekalongan grade 4 students are active in their environment, which means they have flexibility towards

the surrounding environment. At MIN Pekalongan itself, many sellers were selling in front of them, and students took the initiative to make what the sellers were selling. Then, the teacher allowed students to observe the MIN Pekalongan environment, especially the sellers. From the students' observations, the teacher then allowed the students to hold a bazaar with the type of sales they made themselves. So that apart from students being able to socialize with the surrounding environment, they can also have the ability to buy and sell. Fifth, growing independence in students. Project implementation in class 4 MIN Pekalongan is carried out in groups, which makes students work together with their group friends to complete the project. With this collaboration, each student grows independent.

Sixth, instill patience and tenacity in students. Making projects carried out by each group certainly requires a long time to complete. A timeline and deadline for project completion were determined before starting the project, and the project was carried out collaboratively between teachers and students. Moreover, when implementing a project to plant plants, namely chili plants, this project takes quite a long time from seeding to growing chili plants, This instills patience and tenacity in students through the completion of the project. Carrying out projects also allows students to solve problems experienced from various angles. However, the problems that can be solved are still related to projects; if not, life problems can be solved.

Supporting and Inhibiting Factors for Implementing the Project-Based Learning (PjBL) Model in Class 4 Science and Technology Subjects at MIN Pekalongan. The implementation of the project-based learning model in science and science subjects in class 4 of MIN Pekalongan has gone well. This is, of course, influenced by the supporting factors that occur. Supporting factors that occur in implementing the PjBL model include internal and external factors. Several internal factors support the implementation of learning using the project-based learning model in science subjects, including the first one from the madrasah, which advises all teachers to use creative models that are student-centered. The next supporting internal factor comes from the students themselves. By using the project-based learning model in science subjects in class 4, students are more enthusiastic about participating in the learning process. Because of the PjBL model, the learning process places more emphasis on practice and creating a project. So, this becomes a supporting factor that allows the learning carried out by teachers to run smoothly and well.

Supporting factors for implementing the project-based learning model in science and science subjects in class 4 MIN Pekalongan also occur from external factors. These external factors come from each student's parents or guardians. During the learning process using the project-based learning model, parents are also very enthusiastic and financially supportive in supporting their children in making a product and developing new skills, so this increases their children's creativity. With enthusiasm and support from parents, science learning makes the project run well. Apart from the supporting factors that occur in implementing the project-based learning (PjBL) model in the science subject in class 4 MIN Pekalongan, which makes the implementation good and smooth, However, the implementation is still not optimal. This is due to the presence of inhibiting factors that occur from both internal and external factors. The internal inhibiting factor that occurs in

implementing the project-based learning (PjBL) model in the science and technology subject in class 4 MIN Pekalongan comes from the students. The shortcomings of the PjBL model are that students have weak motivation and activeness when collecting information and conducting experiments. At the time of implementation, there were several students whose communication was still lacking and lacked self-confidence. When forming groups, many students also want to be in a group with their close friends.

Apart from that, implementing the project-based learning model also requires a lot of time because, in the learning process, there are project-creation activities. In fact, in some projects, it takes quite a while to complete the project. This requires a lot of time and is also one of the factors that hinder the implementation of the project-based learning model. In the implementation, there is also an inhibiting factor, namely that the available land at MIN Pekalongan is still insufficient. However, the science and science subject teacher and class 4 homeroom teacher did not just allow this inhibiting factor to occur. Class 4 homeroom teachers try to minimize the occurrence of inhibiting factors by finding various ways to find solutions. For example, in forming groups, the science subject teacher, as well as the class 4 homeroom teacher, allow and provide one meeting opportunity for students to determine their groups according to what is desired in implementing the PjBL model. However, for the next lesson, when doing another project, students must follow the teacher's instructions in forming groups.

CONCLUSION

The implementation of project-based learning in science in class 4 consists of three stages, including the planning stage consisting of identifying learning materials, creating teaching modules, and communicating with students. The implementation stages include asking basic questions, creating a project design, preparing an activity schedule, project implementation and monitoring, assessment of project results, and evaluation of the learning experience. The evaluation stage consists of measuring understanding, skills, and attitudes during the learning process through tests, observations, and project performance results, as well as the teacher's reflections on implementing the PjBL model. The embedded creativity attitudes include students' imaginations emerging when creating projects, the greater the students' curiosity, daring to take risks, being easy to adapt to the surrounding environment, increasing student independence, and instilling patience and tenacity in students.

Supporting and inhibiting factors that influence the implementation of project-based learning in science are: the school supports teachers to always use creative and student-centered models; students are more motivated, enthusiastic, and enthusiastic about learning; and parents are enthusiastic and supportive of their children doing projects. However, some students still lack communication and lack self-confidence. When forming groups, many students want to be in a group with their close friends. Requires tools and materials to be provided, so parents object because they spend a lot of money on necessities. The time required for the PjBL model requires a lot of time, and there are even some projects that require a long time.

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