



Project-Based Learning (PjBL) Learning Model in Improving Critical Thinking Abilities in Elementary Schools to Support 21st Century Learning

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Abstract: This research aims to determine how the project-based learning (PjBL) learning model improves critical thinking skills in elementary schools. The research method used in this research is a literature study. Data collection techniques were done by reviewing articles from various national and international journal sources indexed by Google Scholar, Garuda, DOAJ, Springer, and others. Other sources are obtained with the help of Publish or Perish (POP) software. The research results show that the project-based learning model can improve students' critical thinking abilities. The project-based learning model is a project-based learning model where students are directly involved in the projects being created. Project-based learning emphasizes students being active because learning is student-centered and the teacher is a facilitator and motivator. Project-based learning answers the challenges of 21st-century learning. It should be developed and implemented in every subject and level of middle and high school education to improve aspects of 21st-century skills.

Keywords: Critical thinking; Project-based learning model (PjBL); Literature Review

Introduction

The development of science and technology (IPTEK) has provided huge benefits and contributions to the progress of various fields such as the economy, industry, health, education, etc. The development of science and technology in the world of education is related to the 21st century which is now known as the era of industrial revolution 4.0. The 21st century is a century based on science and technology, so it requires humans to be superior and competitive in mastering various forms of skills (Ramdani et al., 2019). The 21st century is a challenge for the education world as students need to be able to develop and compete with others. Facing the challenges of the 21st century, there are several ways to prepare quality students, one of which is by implementing interactive, innovative, collaborative, and fun learning in the learning process.

Facing the challenges of the 21st century, students must be equipped with skills by changes in science and

technology (science and technology). Schools, which are formal and informal educational institutions, must pay attention to the skills that students must have, such as creative thinking, critical thinking, problem-solving, communication, and collaboration referred to as the 4C skills (Septikasari and Frasandy, 2018). In line with, (Hana and Siskandar, 2020) 21st century skills include independent learning skills, ethics and responsibility, communication skills, thinking skills, teamwork and flexibility as well as scientific, language, and numerical literacy skills to train communication, collaboration, thinking skills, critical, creative, and innovative. The development of 21st-century skills has been pursued in the world of education by the Ministry of Education, one of which is through change (Fitriyah and Ramadani, 2021). Current learning and curriculum must adapt to developments in science and technology (IPTEK) so that students can have 21st-century competencies and skills.

Critical thinking is the ability to analyze situations based on facts and evidence to obtain a conclusion

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(Agnafia, 2019). Critical thinking is a reasonable or logical way of reflective thinking that focuses on determining what to believe and do. Teaching critical thinking skills means equipping students with the skills to investigate and evaluate fake information or news (Wilson, 2018).

Critical thinking is the ability to apply higher cognitive skills for example, analysis, synthesis, self-reflection, perspective-taking, and the disposition to consider thoughts that lead to logical and appropriate actions (Jaffe et al., 2019). In line with the opinion of Facione (2015), critical thinking ability is if someone can analyze, organize, evaluate, and solve problems. Students are expected to be able to master critical thinking skills in classroom learning, including being open-minded, encouraging intellectual curiosity, developing strategies and planning collaboratively, and intellectual caution (Maqbullah et al., 2018).

The project-based learning (PjBL) learning model is a type of learning that organizes students to build their knowledge independently through investigations and discussions to solve problems to achieve the targets that Tseng has planned (Sari et al., 2017). The project-based learning model requires students to be able to solve problems, make decisions, or investigate activities so that students have the opportunity to be independent in producing realistic products and presentations. The project-based learning learning model can facilitate students in gaining knowledge and acquiring the skills needed such as self-confidence, communication skills, flexibility, the ability to work together with other students, and being able to motivate themselves (Diana et al., 2021).

Based on the explanation above, this article will discuss the project-based learning (PjBL) learning model in improving students' critical thinking skills and learning independence at the elementary school level by reviewing several articles that have been analyzed. The question in this article is "Can the project-based learning model improve critical thinking skills in elementary school learning to support 21st-century learning?"

Method

The method used in writing this article is a literature study. Literature research is carried out by reviewing articles and books related to the topic being researched and discussed. This research uses sources from several national and international journals from the indexer's Google Scholar, Garuda, DOAJ, Springer, and so on. Other articles were obtained with the help of Publish or Perish (POP) software. Publish or Perish (POP) is software that is presented as a tool for searching articles. In addition, the publish or perish software

provides exploration with the Google Scholar database and provides many articles on the Scopus database (Trenngonowati et al., 2021). After obtaining various theories from sources, the author synthesizes and concludes these theories. After obtaining various theories from sources, the author synthesizes and concludes these theories.

Result and Discussion

The Project-based learning (PjBL) learning model is innovative learning that is student-centered and places the teacher as a motivator and facilitator, where students are directly involved in problem-solving activities that will later produce a product (Aminullah, 2017). In line with Maya and Suparman (2019) the project-based learning model is a learning model that uses projects/activities as a medium and focuses student activities on exploration, assessment, interpretation, synthesis, and information to produce various forms of work results. The project-based learning model provides students with the opportunity to learn and work together in solving problems and then presenting the results of their activities (Citradevi et al., 2017).

The project-based learning model is carried out by giving assignments to students within a certain period and time starting from planning, collecting data, organizing, processing, and delivering products, and using or exploiting projects or activities as media (Widyastuti, 2022). The project-based learning model has the potential to create a more interesting learning experience where students are required to think creatively and can work in teams or groups to shape student creativity and student learning experiences with real projects (Jannatu et al., 2015). Project-based learning directly focuses on knowledge, productivity expectations, and measurable results (Biazus and Mahtari, 2022). Several studies show that project-based learning can positively influence student performance, retention, interest, and self-efficacy at the elementary, middle, and high school levels (Santos et al., 2023).

The project-based learning model assigns students assignments that will result in a final project after completing a series of tasks, whether it is a written, oral report, or design and model (Guo et al., 2020). There are eight characteristics of the project-based learning model according to (Kelana and Wardani, 2021) namely: Students make decisions and create a framework, there are problems where the solution to the problem is not determined beforehand, students plan and design the process for working on the project, participants are responsible for getting and manage the information collected to solve problems collaboratively, students search for information and carry out continuous

evaluations, students reflect or evaluate the activities carried out, the final result in the form of a product is assessed for its quality and evaluated qualitatively, there is an agreement in the class that tolerates errors and changes on the product.

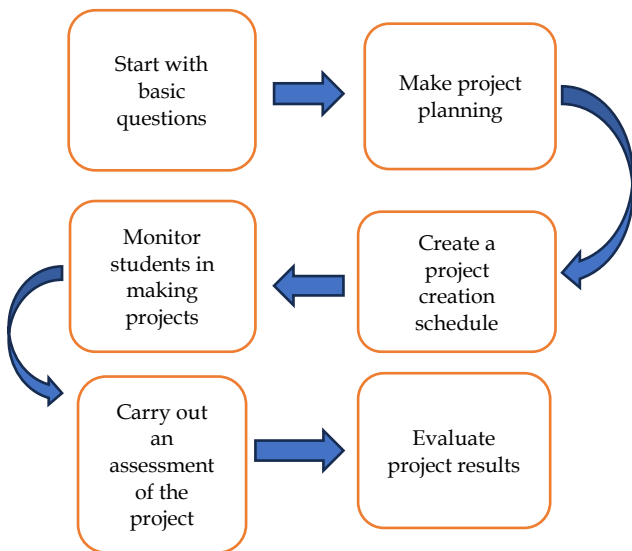


Figure 1. Sintak PjBL (Widyastuti, 2022).

The advantages of the project-based learning model are: creating a varied learning atmosphere, avoiding boredom during learning, and making the environment more interesting, fun, and exciting for students (Irman and Waskito, 2020). Another opinion regarding the advantages of the project-based learning model according to Hartono and Asiyah (2018), is that students are motivated to learn more creatively and can solve project-based problems can increase collaboration and cooperation in groups, and can make the learning atmosphere more enjoyable so that it requires students to have scientific attitudes such as thoroughness, honesty, responsibility, and creativity.

Characteristics of Elementary School Students

Elementary school students according to Piaget's theory (Shunck, 2012) enter the concrete operational development stage (aged 7 - 11 years), at this stage children will begin to learn to form concepts, see relationships, and solve problems in concrete situations (Khaulani & Irdamurni, 2020). The characteristics at this stage are classification, reasoning, understanding, conservation, and elimination of egocentrism (Anditiasari and Dewi, 2021).

The concrete operational stage is characterized by extraordinary cognitive growth and is a formative stage in school education because this is the time when children's language and basic skill acquisition accelerates dramatically. Children begin to show some abstract thinking although it is usually defined by

actions. At the elementary school level, characteristics are of course divided into two, namely characteristics of students in early grades (grades 1-3) and characteristics of students in high grades (grades 4-6) (Amelia, 2019). In the high-class phase, children reach a very high level of objectivity, or what is often called a period where they like to investigate, try something new, and experiment. The characteristics stated (Mustadi, 2020) in the high class are that their attention is focused on their daily life, they have a desire to learn and are curious, students like to form groups with their peers and children view grades as the result of their learning achievements at school.

Critical Thinking Ability

The ability to think critically is Critical thinking is the ability to analyze information, determine the relevance of the information collected, and then interpret it in solving problems (Mutakinati, Anwari, and Yoshisuke, 2018). Critical thinking skills are very important and help students in the learning process (Riti et al., 2021). Critical thinking is widely considered an important competency to learn, and its importance has increased over time (Loyens et al., 2023). Critical thinking helps students determine which information is important and which is irrelevant or useless (Su et al., 2016). In line with the opinion of Tiruneh et al. (2017), states that critical thinking is the ability to draw valid conclusions, identify relationships, analyze probabilities, make logical predictions and decisions, and solve complex problems. Critical thinking makes students able to search for sources of information that are relevant to themselves and the problems they face and know how to process important information to solve their problems (Rohmatin, 2014).

There are six indicators of critical thinking abilities, namely: interpretation, analysis, evaluation, inference, explanation, and self-regulation (Maesaroh, 2021). Meanwhile, according to Ennis (Agustin and Pratama, 2021), there are five indicators, namely: providing a simple explanation (elementary clarification), building basic skills (basic support), concluding (inference), providing further explanation (advance clarification), organizing strategies (strategies and tactics).

The Importance of Project-Based Learning Learning Models Can Improve Critical Thinking Abilities

Project-based learning is learning that produces products to encourage students to learn central concepts and principles through projects (Loyens et al., 2023). Project-based learning aims for students to gain more mature learning and understanding of theoretical concepts through real application rather than just memorizing and applying concepts in classic classroom problems (Gomez-del Rio et al., 2020). Through project

activities, students are encouraged to use their creativity to solve problems in their environment by utilizing their knowledge and skills to produce unique and creative products (Yustina et al., 2020). The project-based learning model is effective for teachers to use because it can awaken students' thinking skills (Anggreni et al., 2019). In line with research conducted by Hikmah et al. (2016), measuring students' critical thinking abilities in colloidal material with presentations 100% in the experimental class with the very effective or very good category and 85% in the control class with the good category with the learning model conventional.

Research conducted by Sularmi et al. (2018) improved students' critical thinking skills using the project learning model. The research results showed that the average value of critical thinking ability in the experimental class and control class, both during the posttest and pretest, increased. The average value is calculated as a gain score, namely the difference between the posttest and pretest of the two classes. From the results of the field test, it was found that in the control class, it increased by 10.48 points, from 64 to 74.48. Meanwhile, the critical thinking score of experimental class students rose 21.04 points from 58.63 to 79.67.

Research conducted by Mabruroh (2019), shows the influence of the project-based learning model on critical thinking skills in science subjects regarding electrical energy. From the research results, the average pretest score was 50.86 and the post-test result increased to 81.57 in the very high category. Based on the results of research conducted, the project-based learning model affects students' critical thinking abilities, where students' critical thinking abilities increase after being given treatment in science subjects. Project-based learning is effective and independent to be applied in learning so that it can foster a sense of self-confidence and responsibility for the work that has been done.

Conclusion

Based on the results of several studies, it is concluded that the project-based learning model can provide great opportunities to improve students' critical thinking skills and is declared feasible and practical to apply in learning. Project-based learning answers the challenges of 21st-century learning and should be developed and implemented in every subject and level of middle and high school education to improve aspects of 21st-century skills.

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Author Contributions

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Conflicts of Interest

The author declares no conflict of interest.

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