

THE IMPLEMENTATION OF PROJECT-BASED LEARNING APPROACH IN STUDENTS' CREATIVITY PROGRAMS IN INDONESIA

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Abstract

Purpose of the study: This study investigates the implementation of the Project-Based Learning (PjBL) approach through Students' Creativity Programs (PKM) in Indonesia.

Methodology: The study implemented a qualitative research approach using observation, depth interview, and document analysis as the research instruments.

Principal Findings: The study revealed that PKM had reflected the implementation of Project-Based Learning approach with all its advantages.

Applications of this study: This study reveals that there are many learning approaches with various activities that can effectively use to develop students' critical and creative thinking skills and students' competitiveness, including Project-based Learning rather than traditional instruction. Other than that, hopefully, the results of the PKM and PIMNASin the form of ideas, goods, and services can be utilized by the business and industrial world as it has economic value and benefits to society and can improve the nation's competitiveness.

Novelty: The implementation of Project-Based Learning in students' massive activity at the national level, known as Students Creativity Programs (PKM) in Indonesia is increasing students' creativity.

Keywords: *Project-based Learning, Innovations, Students' Creativity Programs, Soft Skills, Nation's Competitiveness.*

INTRODUCTION

Much progress has achieved by Indonesian people in various fields at 74 years of independence. However, many things must do by all nations. Considering the level of progress achieved at this time in many respects has not yet reached the level of progress as aspired. That is to make this nation to become an independent, sovereign, fairness, and prosperous nation (Constitutions of The Republic of Indonesia 1945 in [Kemenko Polhukam, 2016](#)). Related to the efforts to achieve national goals, Indonesia has many potential resources. The potential resources include abundant natural resources and a population of more than 266 million people, most of which are of productive age.

The era of globalization or the industrial revolution 4.0 indicates additional problems that are no less severe ([Alaloul, et al., 2019](#)). To face the industrial revolution 4.0 successfully, Indonesian people must compete with other nations in the mastery of science and technology, especially in innovations emerging faster in other countries. The nation's competitiveness is very dependent on the innovation produced by the country. Nowadays, the Indonesian nation's innovation competitiveness is ranked 85 out of 129 countries ([Global Innovation, 2019](#)). Whereas, index of creativity of Indonesian students is ranked 115 out of 125 countries ([Florida et al., 2015](#)).

Innovation can generate through the continuous creative process ([Egan et al., 2017](#)). It means that if the index of Indonesian students' creativity is low, then fertile innovation cannot be expected to be developed in Indonesia. From the opinion of educational experts, 30% of creativity is derived from birth, while the remaining 70% developed through the educational process. The statement above means that if the Indonesian students' creativity index is low (ranked 115 out of 125 countries), it can hypothetically say that our education system has not provided a conducive climate for creativity development.

Hopefully, higher education as the frontline in the development of science and technology plays a significant role in developing creativity. Many things have been developed by the ministry of technology research and higher education to develop students' creativity through curricular, co, and extra-curricular activities. To achieve the objectives, we need to apply strategy, approach, method, and technic of teaching and learning that provides an excellent opportunity to emphasize creativity. One such model and approach is Project-based learning (PjBL). Among activities designed to implement PjBL is a national student's extra-curricular activity known as the Students Creativity Programs (Program Kreatifitas Mahasiswa, abbreviated as PKM). About creativity, [Wu & Wu \(2020\)](#) argued that creativity development would influence the development of cognitive, motivation, and personality traits.

Based on the problem mentioned above, this study intends to find out whether PKM, which is a learning program carried out through extra-curricular activities in practice, articulates the characteristics and advantages of the Project-Based Learning (PjBL) approach.

LITERATURE REVIEW

Students' Creativity Program (Program Kreativitas Mahasiswa, abbreviated as PKM) is an activity carried out by the Directorate of Student Affairs Ministry of Research, Technology, and Higher Education of the Republic of Indonesia. PKM aims to guide students to become individuals who know and obey the rules, creative and innovative, and cooperative in building a single diversity of intellectual property ([Direktorat Jendral Pembelajaran, 2018](#)).

The final program of PKM is Students National Scientific Week (Pekan Ilmiah Nasional, abbreviated as PIMNAS). It is administered in collaboration between the Directorate of Student Affairs Ministry of Research, Technology, and Higher Education. The host of PIMNAS is one selected university that moves from one tertiary education institution to another. In the last five years, PIMNAS has held at Udayana University in 2019, Yogyakarta State University in 2018, Muslim University in 2017, Bogor Agricultural University in 2016, and Halu Oleo University in 2015.

For students, PKM not only aimed at practicing professional skills in their respective fields of knowledge but also simultaneously aimed at providing the abilities known as soft skills. Those skills are teamwork, leadership, courtesy, mutual respect, communication skills, and the likes. Stages in PKM foster the ability to think critically and creatively, build social cohesiveness among the students, and also build the spirit of togetherness and independence. Moreover, it builds scientific attitudes such as thoroughness, grace, heightening curiosity, and expected to thicken students' faith and nationality. The most important thing is that PKM teaches students to become life-long learners.

To obtain the various objectives, it is crucial to apply approach, strategy, or method that provides the most significant opportunity to make it happen. One such approach is the Project Based Learning (PjBL). In his explanation, [Dewey \(1938\)](#) suggested that Project Based Learning is a natural form of learning. Learners' experiences and ideas become the source of the formation of meaning, so it is proven when people say that Project Based Learning is learning that is rooted in constructivism theory.

Following John Dewey's opinion, the [National Education Association \(2019\)](#) elaborates that the essentials of PjBL are supported the "learning by doing" approach to education. Nowadays, after completing the study, students will face outside classroom life and various problems in the real world. The habituation of learning using PjBL can link the connection between learning in the classroom with outside classroom life. The condition happens because, in PjBL, learning activities are centered on students so students can explore more information and knowledge from their learning activities. Observations and evaluations conducted by [Tasci \(2015\)](#) suggest that this PjBL specifically raises the characteristics of constructivism proposed by [Dewey \(1938\)](#).

The fundamental change in learning activities from teacher-centered to student-centered makes PjBL suitable for the characteristics of PKM. The student-centered approach is crucial as it can develop essential skills needed to face the 21st Century, including cooperation, independence, thinking, negotiation, collaboration, and communication ([Bell, 2010](#)). Furthermore, it is now increasingly recognized that essential learning results are not only hard skills but also soft skills. The stages of the PjBL explicitly and implicitly build the ability of learners' soft skills such as building teamwork, building a culture of mutual care and building togetherness that will have an impact on increasing the unity and integrity of the nation. [Roessingh & Chambers \(2011\)](#) argue that the implementation of critical theory in inquiry, negotiation in force, reflection, problem-based learning, and case analysis has shifted. Initially, critical theory implemented in a lecture-based approach, but now it is more open-ended process-oriented.

We can observe that soft skills' character, which is desired by Indonesia's prominent human resources, can be awakened in a learning activity with the PjBL model. The statement above is in line with [Sepulveda's \(2016\)](#) opinion that PjBL is a teaching method that presents students with a problem or challenge to solve requires them to gather information from various resources and ask them to come up with a new solution that ends in a product or performance. [Roessingh & Chambers \(2011\)](#) argue that the implementation of critical theory in inquiry, negotiation in force, reflection, problem-based learning, and case analysis has shifted. Initially, critical theory implemented in a lecture-based approach, but now it is more open-ended process-oriented.

The explanation of the PKM character above is in line with the following PjBL characteristics. In PjBL activities, students practice an ongoing basis to have the response skills needed to face the 21st Century. These skills include learning and innovation (4C: critical thinking and problem solving, creativity & innovation, communication, and collaboration skills). Students expected to have a career in their lives by having flexibility, adaptability, accountability, and the likes. To be able to face the challenges of the 21st Century, students need to be equipped with digital literacy capabilities, including information literacy, ICT literacy, and media literacy.

Also, PjBL can reach the main themes that are appropriate to the times. Likewise, the themes of actual are solving complex problems, financial, economic, business, and entrepreneurial literacy, civic literacy, health literacy, and the likes. The PjBL steps are as follows: First, Question (the essential question is the problem or challenge you pose to your students to solve). Second, Plan (arrange the project design). Third, Schedule (think about how long the project will last and set a deadline). Fourth, Monitor (think about how can teacher monitor student work). Fifth, Assess (think about how you will assess student work), Evaluate (think about what are the skills you want to evaluate), ([Edutopia, 2017](#)).

METHODOLOGY

This study uses a qualitative approach to look deeply into the implementation of PjBL within PKM activities. The qualitative approach use as the study tries to look in-depth into certain activities (Fraenkel, Wallen, Hyun, 2012). To obtain data, an observation, in-depth interview, and document analysis carried out. The subject of this study was 30 participants of PKM/PIMNAS from various universities and 5 (five) examiner of PIMNAS 2019 that recruited respondents in this research.

DISCUSSION

There are several fields competition in PKM, namely Research PKM, Entrepreneurship PKM, Application of Technology PKM, Community Service PKM, Copyright Initiatives, Written Ideas, Constructive Futuristic Ideas, and Scientific Articles. In summary, the initial journey of 8 (eight) PKM fields leads to the National Student Scientific Week (PIMNAS), except PKM-AI, because the product of PKM-AI is in the form of scientific articles so that it is irrelevant to perform in PIMNAS.

The Conformity of PKM and PjBL

In essence, the PjBL model broadly consists of three activities; namely, students focus on questions, challenges, or problems which they then examine and try to solve. Schuetz (2018) argues that with project-based learning, learning is done based on inquiry. In other words, the process of helping students make choices and providing opportunities for students to obtain feedback to revise plans and projects to carry out. Therefore students need to present their problems, research processes, methods, and results to be achieved. To be able to do it all, Schuetz (2018) emphasizes the importance of 21st Century skills, namely: critical thinking, communication, collaboration, and creativity.

Furthermore, there are seven key elements in designing the project, known as the Gold Standard, namely Challenging Problems or Questions, Continuous Investigation, Authenticity, Student Voice and Choice, Reflection, Criticism and Revision, Public Products (Schuetz, 2018). Those seven critical elements in designing the project traversed by PKM participants.

The following table shows PKM conformity with the PjBL characteristics. Based on interviews and surveys towards PKM participants and PKM reviewers, all stated that PKM meets the criteria of the PjBL approach (Supratomo & Baso, 2007; Erdogan & Bozeman, 2019, Yohon, 2016).

Table 1: PKM conformity with the PjBL Criteria

No.	Characteristic of Project-Based Learning (PjBL)	PKM Activities
1	Students are involved in identifying, choosing, and formulating problems that relevant and meaningful to their real-life.	✓
2	Students are required to have the ability to research to solve problems, starting to think critically, planning, and doing research.	✓
3	To complete a project, students must have specific content knowledge related to the project.	✓
4	Working on projects makes students learn about effective ways of communicating and working together in teams as they will need in their real life in the community.	✓
5	Carrying out projects allows students to learn and practice the skills needed in work and careers as they grow up.	✓
6	PjBL also shows an increase in student achievement.	✓
7	Students criticize the experiences they have and relate them to certain standards.	✓
8	At the end of the project, students must make the presentation or approve the project's products and approve or asses.	✓

The Benefits of PjBL in PKM

Schuetz (2018) explicate that benefits of PjBL, among others, connect students to the real world, bringing about a focus on long-term retention, improves student attitudes toward education, keep students engaged, building intrinsic motivation. PjBL helps students develop teamwork, problem-solving, and communication skills, as well as reinforce the social-emotional learning (SEL) and positively correlate with student achievement. Furthermore, the administration of PjBL highly connected positively with student achievement, mostly in schools located in the poverty area.

Furthermore, Strobel & Van Barneveld (2009) argued that in PjBL, students demonstrate long-term retention of content, perform similar if not better, than traditional learners in tests, improve problem-solving and collaboration skills, and have a more positive attitude towards teaching-learning activity. Chen & Yang (2019) research indicating that the activity in PjBL develops a sizeable positive effect on students' academic achievement compared with traditional instruction.



By analyzing the benefits of PJBL above, we can see that PKM possesses strong potential in developing students' critical and creative thinking skills, and competitiveness, students' academic achievement, such as the characteristics of PjBL.

Many Types Of Activities Reflect Many Choices To Answers Real Problems

The many fields of competition in PKM is a way not only to accommodate many and varied students' interests but also to provide ample opportunities for a variety of problems that the diversity of the problems handled. It is a reflection of the desire to provide students the flexibility to articulate creativity and reasoning. For the government, it is an effort to create conditions and climate for the development of students' creativity and increase Indonesian nation competitiveness. [Wahidin\(1993\)](#) explains that creativity is a divergent thinking process, while “divergent thinking characterized by producing a wide variety of alternative solutions, each of which is logically possible.

PKM Stages as Scientific Reasoning and CreativeThinking Processes

In PKM, to meet the final stage, students must go through a long process. It starts with being aware, identifying problems in coming up with the idea of problem-solving, and proceeding with testing ideas and casting ideas ([Amamou & Lilia, 2018](#)). The process continues into a creative work until compiling a written report, presenting the report through the presentation and poster presentation activities at the PIMNAS. In this long process, it closely integrated with the process of scientific thought or scientific method with a paradigm of rigorous scientific reasoning with a creative process that develops to flow in a deep groove to another simultaneously.

As Anderson in [Wahidin\(1993\)](#) said, scientific reasoning occurs by taking these several steps: being aware of, identifying and formulating problems, formulating hypotheses, testing hypotheses, and drawing conclusions. While the creative thinking process carried out in steps, as Wallace's elaborates in [Wahidin\(1993\)](#) are preparation, incubation, illumination, and verification. Students in PKM experience many thinking processes. In PKM and PIMNAS, students need to follow the guidelines as follows: preparing proposals, uploading proposals, entering stage 1 selection, if passing stage 1, then following stage 2 selections. Next, carrying out PKM activities, following monitoring and evaluation activities, completing activities, preparing final reports, follow the selection to PIMNAS (presentation and poster). Students who take part in these activities will experience a long process of undergoing real scientific and creative thinking processes and applying them to problem-solving helped by the use of the internet and technology. The use of the World Wide Web to find much information is one component in finding a solution in PJBL ([Wah Chu, 2017](#)).

Working Together for an Extended Period

Students' participation in PKM carried out in groups consisting of 3-5 people. The group activity guided by supervisors and senior mentors who have followed PKM in previous years. The entire process of participating in the PKM will take about ten months to complete, from preparing the proposal to the final PKM product. Hopefully, PKM participants will get to know each other, share assignments, care for each other, respect each other, and work together in teams in an intense scientific atmosphere. [Strobel & Van Barneveld \(2009\)](#) state that project-based learning is a teaching and learning approach in which students gain knowledge and skills by working for an extended period to investigate a complex problem, or challenge. Students were required to develop their communication skills in these activities as [Magleby & Furse\(2007\)](#) research indicated that PjBL could be used to foster communication skills and team building and other soft-skills building.

PKM and the Creation of an Excellent Academic Climate

PKM carried out in several stages and an extended period. The level of competition followed by PKM participants gradually starting at the study program, faculty and university level, regional level (LLDIKTI), and up to the national level at PIMNAS. It can directly state that PKM encourages the creation of experts needed by this country and nation to increase national competitiveness. A competitive atmosphere created so that students are ready to compete and collaborate. [Kelly et al. \(2018\)](#) suggested that competition is an effective way to foster career interest in a specific STEM career. Moreover, [Abernathy & Vineyard \(2001\)](#) also said that science competition involved students in developing and using science skills and scientific reasoning to build new content knowledge and increase student interest in science. Furthermore, based on observation conducted by [Kuech & Sanford \(2014\)](#), it indicates that science competition fosters students' interests in learning science and mathematics and increases positive participation in learning it.

PKM and Learning to Think

PKM activities require thinking skills, so it emphasizes in providing more opportunities for students to think. Mainly when students design the works that required them to think. The activities include observing, comparing, summarize, make decisions, solve problems, hypothesize, interpret, design experiments, imagine, concluding, and many other activities that require students to think, which is the operationalization of cognitive processes ([Wahidin, 1993](#))

PKM Facilitates Soft Skills Development

PKM is the students' activity with various platforms. It is an extra-curricular learning activity that has the potential to instill students' soft skills. Particularly concerning the ability to build the ability to work in a team, leadership, communication, discipline, and other abilities. The main objective of PjBL, among others is teamwork, so most of the

task is done and presented as a group. Working in a group and obey grouping rules is one of the critical steps in team building because a member of the group needs to interact and communicate with other members (Zhou et al., 2013). Communication skills have an essential part in education in order to prepare students to be competent to compete with other students.

Magleby & Furse (2007) propose that PjBL activity that integrated communication skill to make reports enhance students' higher-order thinking skills and increase their communication skills, especially improve their technical writing. Softskills development happened because PKM is carried out in groups, carrying out various steps and stages in which there are activities of scientific thinking (scientific method), taking steps to think creatively, directly dealing with real problems in the field, and the likes.

PKM Enhance Students' Self-Confidence

Based on many years' observation, the implementation of PjBL in PKM increases students' self-efficacy as students believe that they can solve the problem and assignment given to them (Choi et al. 2019). Moreover, students' participation in PKM and the activity of exploring creativity may increase personal motivation (Wu & Wu, 2020). Moreover, Schuetz (2018) says people intrinsically motivated by three things—autonomy, mastery, and purpose.

Innovation in PKM/PIMNAS and Its Next Activities

Many brilliant ideas and innovations have emerged in the PIMNAS PKM activities. However, they have not been able to be realized in the commercialization of products that can be adopted by industry or further research that leads to the production of goods or services of economic value. The continuation of PKM and PIMNAS activities until now is still contemplating so that the participants' bright ideas will not disappear without benefit. Students need to conduct further activities to stimulate further research and innovation to improve the nation's competitiveness. Some experts said that 30 % of creativity formed through the genetic aspect, while 70 % develop in the education process.

CONCLUSION

From the finding and discussion above it can be concluded that: (1) PKM on various sides has shown that the activities in it reflect PjBL characteristics with all its advantages to build a smart and superior society that is critical, creative, competitive (2) PKM has the potential to develop thinking skills, especially critical and creative thinking skills as capital for the development of various innovations that are key to increasing the nation's competitiveness (3) PKM has the potential to develop a scientific and academic climate in higher education because PKM involves all academic elements of higher education, namely students, lecturers, leaders of higher education as well as other educative staff such as administrative staff (4) PIMNAS as a follow-up event of PKM is not only an evaluation of PKM activities but also an arena of competition among students from all over Indonesia. The activity also designed as an activity to create a competitive atmosphere for higher education students to raise motivation for the student to learn and get the achievement and also make them become prominent and competitive persons. (5) PKM, as a learning approach, not only achieve direct targets in the form of obtaining the skills of making proposals to reporting skills, but also a very potent activity to build and grow soft skills. The soft skills include mutual care and mutual respect, teamwork, resilience in a competitive atmosphere, effort, curiosity, empathy, grace, leadership, and communicating both verbally and in writing. Furthermore, PKM strengthens a sense of discipline, responsibility, initiative, tolerance, building social cohesiveness, building networks, and of course, can foster a sense of patriotism of the participants.

LIMITATION AND STUDY FORWARD

Although this study already portrayed the implementation of the Project-Based Learning (PjBL) approach through Students' Creativity Programs (PKM) and reveal many benefits of PjBL in increasing students' creativity, there are various limitations found. First, in terms of a small number of participants that make the researcher found difficulty in applying the conclusion for a broader scope.

Secondly, in terms of methodology, it would be better if the research implements research and development study as it might reveal more comprehensive findings. Lastly, this study only assesses the impact of PKM for a single shoot. Further research is needed to gain a complete understanding of how PjBL increases students' creativity.

For future activity, (1) Continued activities needed as a continuation of PKM PIMNAS in the form of direct use or further research. So those bright ideas and innovations are not only completed at the idea level but are eliminated to produce goods or services or innovations that are of economic value and utilized by the industrial world effort. Moreover, no less important is being able to increase the competitiveness of the nation. (2) More research still needed to search and produce a deeper understanding of Project-based Learning with any positive benefit in the Indonesian universities' learning process, especially for solving the low capacity of Indonesia's students' creativity.

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AUTHORS' CONTRIBUTION

Wahidin designed, developed, analyzed, linked the theory, and the result continued by working on the manuscript of the research with the support of Lestari, who assisted in collecting and interpreted the result. Both authors discussed the result and commented on the manuscript.

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