



## Developing Students' Entrepreneurship Competencies through Problem and Project Based Learning Model

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*Receive: 17/07/2023*

*Accepted: 15/09/2023*

*Published: 01/10/2023*

### Abstract

Indonesia often faces the problem of a lack of job opportunities which results in high unemployment and fewer opportunities to find work for school graduates. Therefore, teacher innovation is needed in learning to foster student competencies such as creativity, critical thinking, problem-solving, collaboration, communication and so on, in which these competencies can be summarized as entrepreneurship competencies. Entrepreneurship competencies needs to be cultivated in every student to form an entrepreneurial spirit, so that they can realize economic development and open their own jobs. To build entrepreneurship competencies through internalization in life, learning in schools requires a comprehensive study of the potential of the learning model used by teachers in learning mathematics. Student-centred learning models such as Problem-based Learning and Project-based Learning indirectly build and instill entrepreneurship competencies in students, including creativity, problem-solving, critical thinking, collaboration, communication, and independence.

**Keywords:** development; entrepreneurship; problem; project; learning; mathematics

### Abstrak

Indonesia sering menghadapi masalah kurangnya lapangan pekerjaan yang berakibat pada tingginya angka pengangguran dan sedikitnya kesempatan untuk mendapatkan pekerjaan bagi para lulusan sekolah. Oleh karena itu, diperlukan inovasi guru dalam pembelajaran untuk menumbuhkan kompetensi siswa seperti kreativitas, berpikir kritis, pemecahan masalah, kolaborasi, komunikasi dan lain sebagainya, dimana kompetensi tersebut dapat dirangkum sebagai kompetensi kewirausahaan. Kompetensi kewirausahaan perlu ditumbuhkan dalam diri setiap mahasiswa untuk membentuk jiwa wirasaha, sehingga dapat mewujudkan pembangunan ekonomi dan membuka lapangan pekerjaan sendiri. Untuk membangun kompetensi kewirausahaan melalui internalisasi dalam kehidupan, pembelajaran di sekolah memerlukan kajian yang komprehensif mengenai potensi model pembelajaran yang digunakan guru dalam pembelajaran matematika. Model pembelajaran yang berpusat pada siswa seperti Problem-based Learning dan Project-based Learning secara tidak langsung membangun dan menanamkan kompetensi kewirausahaan pada diri siswa, antara lain kreativitas, pemecahan masalah, berpikir kritis, kolaborasi, komunikasi, dan kemandirian.

**Kata Kunci:** pengembangan; kewirausahaan; project; pembelajaran; matematika.

### Introduction

The government's efforts to overcome unemployment in Indonesia must receive support from various parties. Currently, the unemployment rate in Indonesia is increasing from year to year. Badan Perencanaan Pembangunan Nasional (Bappenas) has stated that unemployment is a major problem in economic development in Indonesia. The high unemployment rate of 6.18% per year also has an impact on poverty levels and regional and regional income inequality. The high unemployment rate can result in poverty and the emergence of crime which is certainly not expected by all parties (Masduki & Kurniasih, 2019; Mulia & Saputra, 2020). Unemployment and poverty are currently major problems for the Indonesian nation that cannot be solved.

According to Badan Pusat Statistik (BPS) data in August 2009, the number of openly unemployed was 8.96 million people (7, 87%) of the total workforce of around 113.83 million people. Of the 8.96 million unemployed people, most of them are in rural areas (Badan Pusat Statistik, 2011). The latest data from the BPS in August 2019, the open unemployment rate reached 7.05 million people or 5.28% of the total workforce (Martanti Dewi et al., 2020). When viewed from the educational background of the unemployed based on BPS data in February 2009 it was 27.09% with elementary education and below, 22.62% with junior high school education, 25.29% high school education, 15.37% vocational education and 9.63% diploma education to Bachelor's Degree (Badan Pusat Statistik, 2010).

One of the factors that cause a country to become developed is when the number of entrepreneurs in the country amounts to at least 2% of the population (Rahma Nastiti et al., 2019). Meanwhile, in Indonesia, only 0.18% of the total population, or 400,000 people become entrepreneurs (Hutagalung et al., 2019). Since 2009, the government has compiled an entrepreneurship-based curriculum that should be integrated into learning aimed at preparing the younger generation to be competitive and able to open a new business world (Ayu Setiawati, 2022). It is hoped that education can improve the quality of human resources by developing the creativity and entrepreneurial spirit of students.

Learning in higher education is student-centered, building self-motivation, and changing oneself to be more advanced. In addition, learning facilitates job expectations and enhances professional abilities (Humpherys et al., 2022). Learners usually acquire and update their knowledge and skills through experiential learning (Kolb & Kolb, 2017) in learning that applies a student-centric approach. The learning model with a student center approach is problem-based learning and project-based learning.

Problem Based Learning (PBL) is a learning model that uses problems as the basis for students to learn. Problem-based learning is done through the presentation of inquiry-oriented problems (Henda Saputra Tanjung & Siti Aminah Nababan, 2019). The problems presented in PBL are problems in everyday life and through these problems are able to stimulate students to study these problems based on the knowledge and experience that students already have so that from the experiences they have students will form new knowledge and experiences. PBL trains students to solve problems that require creative thinking. PBL uses a lot of problem solving as a learning activity and provides opportunities for students to think creatively, express critical ideas, and communicate the results of their work to friends.

While the project-based learning model or project-based learning (PjBL) is a learning model that provides opportunities for teachers to manage learning in the classroom by involving project work. Project work in project-based learning is seen in the process, creativity, critical thinking, and student activities in the learning process so that it will have an impact on increasing student learning outcomes (Alzaabi, 2022; Samuel Osunbunmi, 2022). The implementation of PjBL accommodates the development of students to acquire skills that will build a strong foundation for their future in the global economy. So that PjBL can be applied as a learning strategy to instill the entrepreneurial character of students.

The focus of the problem in this article is the content of the entrepreneurship competencies built through

mathematics learning that applies problem-based learning and project-based learning models.

## Research Methods

This article was compiled using a method in the form of Library Research (Sugiyono, 2017). The data sources used for this research are books, journals and internet sites related to the chosen topic. The data collection technique in this study is documentation, which is looking for data about things or variables in the form of notes, books, papers or articles, journals and so on (Suharsimi Arikunto, 2013). The data analysis technique used in this research is content analysis method. This analysis is used to obtain valid inferences and can be re-examined based on the context (Krippendorff, 1993). In this analysis, the process of selecting, comparing, combining and sorting various meanings will be carried out until the relevant ones are found (Sugiyono, 2017).

## Result and Discussion

Based on the search results on various data sources in the form of books, journals, and research reports through the Google Scholar Google Books, ScienceDirect, and PubMed search pages, references are obtained regarding the variables studied in this article. The sources used in this article consist of 37 international journals, 24 national journals, 2 reports, and 7 books.

### 1. *What entrepreneurs are*

The most contemporary entrepreneurial theory that has had a lot of influence and contribution is the theory developed by Schumpeter (1911), Knight (1921) or Kirzner (1973) (Scheaf & Wood, 2021). Schumpeter emphasized the importance of entrepreneurship as the main vehicle to move the economy so that it can move from a static balance through various dynamic innovations and directing creative processes that are destructive, testing existing structures and changing the economic balance. Anyone who carries out this function is an entrepreneur, regardless of whether the person is independent or the person works for a company. Schumpeter also clearly distinguished the roles between investors and innovators (Aydin et al., 2018; Dalton & Logan, 2022).

Kirzner (1973) views that the entrepreneur moves the economy towards balance (in this case Kirzner's opinion is different from Schumpeter's opinion). More generally, Kirzner (1973) argues that the way of looking at Entrepreneurs is the idea that Entrepreneurs is the notion that Entrepreneurs explain competitive behavior that directs market processes. This definition, which is based on the incorporation of behavior and outcome, is considered solid and able to provide a real and satisfying explanation of the role of Entrepreneurs in society (Demmert & Klein, 2003; Hattwick, 1979). Some concepts

about Entrepreneurs seem to be synonymous with the ability of entrepreneurs in the business world. In fact, in reality, entrepreneurship is not always synonymous with the character/characteristic of entrepreneurs alone, because the characteristics of entrepreneurs are also owned by someone who is not an entrepreneur (Elkjaer, 1991).

If we narrow the area of the role of entrepreneurs in the economic field, entrepreneurs are people who formulate new ideas, recognize opportunities, and translate these into added value to society by assuming the risk of starting a business—are a major source of economic growth for many economies (Baron, 1998). McLelland (1961) identified a 'need for achievement' as a key driving force in the personality of entrepreneurs. They are able to see and act on opportunities, they are assertive; and they demonstrate commitment to others (McLelland D.C, 1961).

So it can be concluded that Entrepreneurship is a person's ability that is cored in creative thinking and innovative actions that form the basis, tips, and resources for solving problems and create opportunities for success in business or life.

## 2. *Entrepreneurship Competencies*

Entrepreneurship is a person's values, abilities, and behavior in facing life's challenges and ways of obtaining opportunities with various risks that they may face (Ayub, 2017; Ferreira et al., 2022; Rina et al., 2019). European Commission defines entrepreneurship as 'individual's ability to turn ideas into action', including 'creativity, innovation, and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives (Fassbender et al., 2022a). McLelland D.C (1961) identified a 'need for achievement' as a key driving force in the personality of entrepreneurs. They are able to see and act on opportunities, they are assertive; and they demonstrate commitment to others. They also have a high locus of control and believe that they can influence events rather than passively accepting what fate bestows upon them. Consequent they behave in a proactive way, taking initiative (Bolton & Thompson, 2004). Meredith G.G et al. (2018) agree, suggesting that entrepreneurs exhibit five core traits: self-confidence, risk-taking activity, flexibility, need for achievement, and strong desire to be independent.

Bolton B & Thompson J (2012) in discussing the action factors that distinguish entrepreneurs, refer to their creativity and innovation, their determination in the face of adversity, their networking abilities, and their ability to manage risk. Handy C (2006) summarizes entrepreneurial characteristics under the headings of dedication, doggedness and difference, comparing them to Francis

Galton's belief that three things were necessary for great achievement: 'ability, zeal and a capacity for hard work'(Enterprise, 2006).

An entrepreneur must have the following characteristics in accordance with Ayub's opinion (2017), among others: Self-confident, task and results-oriented, the courage to take risks, leadership, future-oriented, have creativity and innovation. The character of an entrepreneur, among others: believes in the self, task, and result-oriented, risk-taking, leadership, originality, future-oriented and creative, communicative, independent, hardworking, responsible the responsible, initiative, action-oriented, and highly curiosity (Anwar, 2021; Erlinda & Montessori, 2020; Maskur et al., 2019; Maulana, 2019; Rina et al., 2019; Yusuf et al., 2019).

## 3. *Problem Based Learning (PBL)*

PBL has become increasingly adopted by secondary schools also in higher education as a strategy to develop knowledge and skills deemed essential for a twenty first century education (Lonergan et al., 2022a). This model exposes students to decision-making, problem-solving and various types of investigative activities. PBL develops thinking skills, social skills, and the ability to collaborate effectively (Sasson et al., 2018). PBL challenges students, to work together in a group to solve problems. This problem is used to provide a challenge to students about curiosity and initiative to complete a problem (Kolmos, 2009; Taufikin, 2017).

Problem-based learning including strategies teach problem-solving where learning mathematics content is done through inquiry-oriented problem presentation (Eviyanti et al., 2017; Ismail, 2018; Lonergan et al., 2022b; Tyas, 2017). The problems presented in PBL are problems in everyday life and through these problems can stimulate students to study these problems based on existing knowledge and experience. This learning activity can form new knowledge and learning experiences (Brown, 2022; Gomez-del Rio & Rodriguez, 2022a; Lonergan et al., 2022b).

PBL has several advantages, Problem-based learning actively engages learners and encourages an in-depth understanding of a topic to allow for long-term knowledge retention. Compared with other methods of learning such as lecture-based learning, PBL emphasizes comprehension and application of the material rather than the simple memorization of facts. So, PBL can encourage student learning activities so that knowledge can be absorbed properly (Bisbee et al., 2022). In addition, the model PBL makes students solve problems actively and accommodate skills higher order thinking. So that students have the experience of learning benefits mathematics

because the problems solved are related to everyday life (Fassbender et al., 2022b).

Kolmos, (2009) emphasizes the components important in PBL, namely: the use of problems as a starting point for obtaining and integrating new knowledge, new information obtained through self-direction own, student-centered learning, organizing students into small groups and the teacher acts as a facilitator and guide. Lonergan et al., (2022a) explained the defining characteristics of PBL are: (a) ill-structured problems are presented as a trigger for learning; (b) problems addressed are authentic, ill-structured, and real-world; (c) learning is self-directed and student-centred; (d) a teacher/tutor is present as a facilitator or guide; (e) learning occurs in small collaborative work groups; and, (f) learner reflection on both the problem-solving process and the resultant learning is integral.

Activities in the PBL model are as follows: (1) Provide orientation about problems to students; (2) Organizing students to research; (3) Help independent and group investigations; (4) Develop and present the work or report; and (5) analyzing and evaluating the problem-solving process (Eviyanti et al., 2017; Maryati, 2018; Tyas, 2017). During learning in this model, the teacher plays a in providing problems, asking questions, facilitating investigations, and discussion (Anazifa & Djukri, 2017).

Based on the description of the opinions of several experts above, it can be concluded that: that the PBL model emphasizes student involvement to solve problems through the stages of the scientific method, which begins with presenting the problem with several solutions. To determine the right and wise solution, students need to determine and collect information that is considered most appropriate the solution they choose so that it has a basis and argument that can be defended by his friends.

#### 4. *Project Based Learning (PjBL)*

Project-based learning has been widely used by teachers as an innovation learning that develops processes based on challenges or problems directing students to conduct investigations/investigations, make decisions, design, and finally conclude by producing a product. Several previous research results show that the application of PjBL is appropriate to be carried out by educators in the 21st century in science learning, technology, machines, and mathematics (STEM) (Anazifa & Djukri, 2017; Goyal et al., 2022a; Guo et al., 2020; Hanif et al., 2019; Wikanta & Gayatri, 2017). Wikanta & Gayatri (2017) added that in the current age of knowledge, the learning paradigm needed are project, problem, inquiry, discovery and creation.

Project-based learning is a comprehensive perspective focused on teaching by engaging students in

investigation. Within this framework, students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts (Palatnik, 2022). Project-based learning (PjBL) is a strategy of learning with student learning activities, namely investigating questions, problems, or complex challenges (Zubaidah, 2019). PjBL involves students in investigations of urgent problems that end in authentic products (Wikanta & Gayatri, 2017).

The project-based learning process is learning that work-based that plays an important role in developing problem-solving skills and student problems related to real work as part of education throughout life. PjBL provides opportunities for students without limits to gain new knowledge and insights based on experience through the presentation of the work. PjBL emphasizes students work independently to produce products: a formal written, an oral report or a design or model (Beneroso & Robinson, 2022a; Gomez-del Rio & Rodriguez, 2022b; Guo et al., 2020; Palatnik, 2022). These studies are closely ligned to research of Sukaesih et al., (2022) which explained that one of the characteristics of PjBL includes providing students with opportunities to explore, make assessments, interpret, and synthesize information in meaningful ways. PjBL allows students to investigate phenomena, facts, or problems more realistically. PjBL also presents various ways for students to demonstrate their knowledge by providing many alternative answers.

Project-based learning must include the next stages: 1) teach content through knowledge and skills, 2) create a need to know important and fundamental content, 3) need critical thinking, problem-solving and collaboration, 4) develop investigation, 5) provide continuous feedback and 6) present or deliver the final product (Gomez-del Rio & Rodriguez, 2022b). While Krajcik & Shin, 2014) indicated six hallmarks of PjBL, including a driving question, the focus on learning goals, participation in educational activities, collaboration among students, the use of scaffolding technologies, and the creation of tangible artifacts. These important components of project-based learning are closely aligned with attributs of Beuchat et al. (2022) are following:

- Duration: a single project spans the whole subject.
- Authenticity: the project topics and phases of execution are close to the professional reality.
- Application of existing knowledge: the project draws haeavily on concepts taught across multiple prior or concurrent subjects.
- Complex and open-ended: complex in the sense of multiple interacting sub-systems where system-level

analysis and integration is critical; and open-ended in the sense of the project having many valid solutions paths/ parameters with assessment emphasizing the engineering process rather than the precise solution.

- Predominantly self-directed: the instructor functions as a guide and mentor, with the students responsible for team management, figuring out how to apply their existing knowledge, and acquiring new skills and knowledge as necessary.

The application of the PjBL model in the research of Wikanta & Gayatri (2017) through the following stages: (1) orientation (orientation); (2) planning a project (planning a project); (3) implementing a project (implementing a project); (4) documenting and reporting project findings (documenting and reporting project findings); and (5) evaluation and taking action (evaluating and taking action). Anazifa & Djukri (2017) mention the PjBL syntax, among others: (1) introduction and project team planning; (2) the initial research stage in terms of gathering information; (3) creation, development, evaluation of initial presentation, and product prototypes; 4) research stage second; 5) final presentation development; and 6) product publication.

Despite problem-based learning and project-based learning are similar in several respects, there are differences in the two approaches when being implemented. A project usually has a broader scope and may encompass several problems. While in problem-based learning the acquisition of new knowledge is more important than the final solution, in project-based learning, the emphasis is in the application or integration of the knowledge, rather than the acquisition of it. In project-based learning, the end product is the central focus of the assignment and the completion of the project primarily requires application of previously acquired knowledge (Gomez-del Rio & Rodriguez, 2022b).

#### 5. *The Entrepreneurship Competencies through Problem-Based Learning (PBL)*

Problem-based learning (PBL) can be used to develop 21st century competencies: (a) self-direction, (b) collaboration, (c) communication, (d) ICT competency, (e) social skills, (f) creativity, (g) critical thinking and (h) problem solving (Capraro et al., 2013; Lonergan et al., 2022a; Ting et al., 2021). PBL fosters self-directed learning, effective problem solving, communication and collaboration skills (Lee & Son, 2022). PBL uses a lot of problem solving as a learning activity and provide opportunities for students to think creatively, express critical ideas, and communicate the results of their work to friends (Eviyanti et al., 2017; Maskur et al., 2019). In addition to improving abilities problem solving, PBL can also be applied to improve skills communication, teamwork, adaptation to change, lifelong learning, and

self-evaluation ability (Kolmos, 2009) because stimulation in the form of problems in PBL encourages students to share knowledge, negotiate alternative ideas, seek information, and build arguments for support the specified solution (Anazifa & Djukri, 2017). According to Taufikin (2017), PBL can be an alternative in an effort to form a noble character such as religious, responsible, hard work, independent, democratic, tolerant, caring environmental and socio-religious, love for the homeland and nation.

The application of Problem-based learning also encourages students to have critical thinking skills in various activities (Qondias et al., 2022). Critical and creative thinking' as fundamental in preparing students to become successful learners, and confident and creative individuals (Albar & Southcott, 2021). PBL is designed to help teachers provide as much information as possible to students through a problem. PBL helps students to develop thinking skills and problem-solving skills, studying adults and become independent students (Aslan, 2021)

Based on the description of the opinions of experts regarding the characters that can be developed in PBL model learning, it can be concluded that the PBL model can be used as a learning strategy to improve entrepreneurship competencies.

#### 6. *The Entrepreneurship Competencies through Project-Based Learning (PjBL)*

One way to develop or improve students' creative thinking is to apply learning models or strategies that encourage students to creative thinking. One of these learning models is project-based learning (PjBL) (Setyarini & Jannah, 2020). The stages of the learning process in project-based learning requires students to embrace a complex set of interplaying skills such as design thinking, reasoning, dealing with uncertainties, making estimates and decisions, communicating to professional standards, or thinking as part of a team (Beneroso & Robinson, 2022b). Gomez-del Rio & Rodriguez (2022b) explained on their research that project-based learning based on the constructive learning model can be very effective for higher level of learning outcomes such as design and lifelong learning, and develops student skills (application of knowledge to practice, oral communication, critical thinking and problem-solving). Several studies on paper of Goyal et al. (2022b) mentioned the prominent advantages of integrating PjBL in higher education include enhanced student motivation, learning various skills independently, or gaining in-depth understanding. It helps students integrate and develop collaboration and execution skills and suitability for a wide range of students and learning styles.

Creativity in PjBL learning is influenced by learning activities, so students must have 1) high and deep

curiosity, 2) able to convey opinions and seek answers by asking other people or looking for answers in books and learning resources, 3) gives a lot of ideas, 4) can develop the imagination that is in himself, and 5) be able to convey results from what is made to others (Rati et al., 2017). Furthermore, Rati et al. (2017) mentioned that the Project-Based Learning model can also improve students' self-confidence, creativity to learn, creative ability, and admire yourself. In addition, the PjBL model has the potential to develop attitudes leadership (King & Smith, 2020).

Project work in project-based learning is seen in the process, creativity, and student activities in the learning process so that it will have an impact on increasing student learning outcomes (Anita, 2017; Rati et al., 2017). Learning project-based is a key strategy for creating independent

thinkers and learners (Sukaesih et al., 2022). Students will solve real-world problems by designing their questions, planning their lessons, organizing their research, and applying many learning strategies. The implementation of PjBL accommodates the development of students to acquire skills that will build a strong foundation for their future in the global economy (Condliffe et al., 2017), including, leadership attitudes (King & Smith, 2020), creativity (Anita, 2017; Hanif et al., 2019; Rati et al., 2017), critical thinking (Sasson et al., 2018), independent (Zubaidah, 2019), and self-efficacy (Samsudin et al., 2020). So PjBL can be applied as a strategy for learning to instill entrepreneurship competencies in students.

## Conclusion

Problem-based and project-based learning can be used as an alternative to student-center learning approaches to build and develop students' entrepreneurship competencies. Teachers can build entrepreneurship competencies such as self-direction, collaboration, communication, ICT competency, social skills, creativity, critical thinking, problem-solving, and independent through problem-based learning. Meanwhile, learning through project-based learning can build collaboration, communication, critical thinking, problem-solving, creativity, self-confidence, leadership attitudes, self-efficacy, and independent competencies. Therefore, learning that builds Entrepreneurship competencies should be trained continuously to develop well. This is needed to produce future generations who are competent in building and improving the Indonesian economy.

## Acknowledgment

The author would like to thank and appreciate the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) of Republic of Indonesia and the Indonesian Education Fund Management Institute (LPDP) for funding the research through Scientific Research Grant of the Independent Research of Lecturers, 2021.

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