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Development of Teaching Modules for Strategic Management Courses Based on Problem-Based Learning to Increase Students' Cognitive Flexibility

Ahmad Saeroji✉, Muhsin, Aulia Prima Kharismaputra

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Department of Economic Education, Faculty of Economics and Bussines, Universitas Negeri Semarang, Semarang, Indonesia

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Abstract

This research aims to develop and test whether the problem-based learning (PBL) teaching module that the author created in the strategic management course can increase students' cognitive flexibility. The research method used is Research and Development (R&D) with the ADDIE model, which includes the Analysis, Design, Development, Implementation, and Evaluation stages. The sample in this study was students of the Office Administration Education Study Program, Semarang State University, class of 2021, with 109 students divided into three classes. Furthermore, the results of the module that has been developed are tested regarding the increase in the average cognitive flexibility score after carrying out the pre-test and post-test. Based on research results, the experimental class that used the PBL module showed an average increase in cognitive flexibility score of 17.3 points, while the control class only increased by 4.4 points. Statistical tests showed a significant increase in the experimental class ($p < 0.001$), while the control class did not show a significant increase ($p = 0.065$). Meanwhile, student activities in the experimental class showed active participation in the learning process, problem-solving involvement, and better teamwork than in the control class. Student feedback indicates that PBL makes learning more enjoyable, helps students think critically, and is relevant to the real world.

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✉ Correspondence Author:
Gedung L Kampus Sekaran, Gunungpati Kota Semarang, Jawa Tengah, Indonesia
Email: saeroji@mail.unnes.ac.id

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INTRODUCTION

In the era of globalization and rapid technological change, the business world is experiencing increasingly complex dynamics and demands high professional adaptability (Dolata, 2009; Fonna, 2019). Students in the Office Administration Education Study Program match their graduate profile as practitioners in the field of professional administration through strategic management courses. The hope is that students will have skills that enable them to face and manage uncertain and changing situations when they graduate. One of the essential skills that needs to be developed is cognitive flexibility, namely the ability to think flexibly, adapt to new information, and find creative solutions to problems that arise (Ismail & Nugroho, 2022; Öztürk et al., 2022).

Strategic Management is a course that focuses on planning and implementing organizational management strategies to achieve a predetermined vision and mission; for this reason, students are expected to have this skill. However, conventional teaching approaches still used in the classroom often need help to stimulate students' critical and flexible thinking abilities. Teaching methods that are one-way and less interactive tend to make students passive and only focus on memorizing theory without understanding its practical application.

Problem-based learning (PBL) is a student-centered learning method proven effective in improving critical thinking skills, problem-solving, and cognitive flexibility (Irwansyah & Perkasa, 2022; Razak et al., 2022; Yuan et al., 2008). For this reason, through the project-based learning (PBL) learning model, students are invited to learn by facing and solving real problems in a course. This process involves theoretical knowledge and encourages students to think analytically and creatively in finding solutions.

Developing and implementing Problem-Based Learning (PBL) teaching modules in higher education has shown various benefits, especially in improving students' critical thinking and problem-solving skills (Halvorson & Wescoat, 2002). However, research that explicitly explores the application of PBL in Strategic Management courses to increase cognitive flexibility still needs to be completed (Hidayah et al., 2021).

Research related to developing teaching modules in strategic management has yet to be widely explored. This course is very relevant to the need for cognitive flexibility, considering the complexity and dynamics of the business world. Teaching modules designed to develop mental flexibility through PBL are rarely found. Previous research focuses on general learning design without providing specific guidance for strategic management courses. Meanwhile, research on cognitive flexibility is mainly carried out in the context of cognitive psychology and primary or secondary education. Specific and valid measurements for higher education contexts, particularly in strategic management, still need to be developed.

This research attempts to fill this gap by developing and testing a PBL-based teaching module in the Strategic Management course. The aim is to provide a significant empirical contribution to the literature and provide practical guidance for educators in developing students' cognitive flexibility skills. Based on this background, this research focuses on creating a teaching module for the PBL-based Strategic Management course. This teaching module is expected to provide a more interactive and applicable learning experience to increase student's cognitive flexibility. Thus, this research contributes to developing more effective teaching methods and improves the quality of graduates ready to face the challenges of the dynamic business world.

Cognitive flexibility is the ability to think about various things simultaneously and adapt one's thinking to new situations. According to Rahayuningsih et al. (2020) cognitive flexibility is the ability possessed by a person to propose solutions to new problems that are different from various strategies, produce new solutions, and change previous frames of thin-

king. Cognitive flexibility involves changing perspectives, adapting to new situations' demands, and integrating relevant information. In higher education, especially in strategic management, cognitive flexibility allows students to respond quickly to changing business dynamics and the complexity of problems faced in the real world (Spiro & JEHNG, 1990; Honn et al., 2019; Braem & Egner, 2018) . Cognitive flexibility emphasizes the learning process where a person can adapt cognitive process strategies when encountering environmental conditions to adapt to new and unexpected things. When someone shows ineffective behavior when faced with different situational demands, fails to deal with changes in the environment, and often takes the wrong attitude, we can say that they have inflexible cognitive abilities (Zulkarnain et al., 2023). Therefore, the ability to think flexibly is needed to solve possible problems along with increasingly rapid developments in unpredictable changes (Rahayuningsih et al., 2020).

Cognitive flexibility skills are necessary for academic achievement. Cognitive flexibility can be trained by providing activities that emphasize variability because this can allow students to practice solving problems in different situations. Providing students with assignments that involve continuous exploration is considered better than directing students to study sub-tasks simultaneously because it will increase the efficiency of transferring attention from one sub-task to another, and this has been proven to improve the ability and transfer of new knowledge and skills (Zulkarnain et al., 2023).

According to the research results, someone needs cognitive flexibility to solve complex problems. Other research related to cognitive flexibility shows that students with high self-confidence in problem-solving strategies tend to achieve a deep understanding of information about the topic/object being studied (Arslan & Yazgan, 2015; Sugilar & Nuraida, 2022). For this reason, self-confidence is the basis for cognitive flexibility in learning. High cognitive flexibility will make it easier for students to find problem-solving strategies, simplify problems, apply effective procedures, and present them coherently and orderly. Apart from that, opinions from Aprianto et al. (2021) students who think flexibly and confidently (cognitive flexibility) will become someone who thinks effectively. Cognitive flexibility focuses on two aspects, namely stimulus and pattern. The greater the value of mental flexibility, the higher a person's problem-solving ability will be (Oktaviani et al., 2021).

According to several research results, cognitive flexibility is needed so that a learning model can foster self-confidence and flexibility in thinking. Hopefully, flexibility will increase when students have completed the learning process. The problem-based learning model from previous research can improve students' self-confidence (Arslan & Yazgan, 2015; Sugilar & Nuraida, 2022).

Project-based learning was carried out by John Dewey, who stated that learning must come from experience. In addition, project-based learning emphasizes an active process for students by transforming information in the form of knowledge so that the information obtained creates motivation, retention, and development of personal abilities (Mayasari et al., 2016).

Strategic Management courses are one area that is very suitable for applying PBL because of their nature, which requires critical analysis, a field of study that studies strategic decision-making, and the ability to overcome uncertainty. According to a survey by Savery (2006) applying PBL in strategic management allows students to understand strategic concepts in a more realistic and applicable context. Students are invited to analyze case studies, develop strategies, and overcome various business challenges, increasing their cognitive flexibility (Savery, 2006).

Various studies that have been conducted previously show that PBL is effective in increasing students' cognitive flexibility. Research by Schmidt et al. (2011) Students involved in the learning process with the PBL model showed significant increases in adapti-

ve skills and the ability to integrate information from various sources. PBL allows students to learn in a dynamic environment, similar to real-world situations, so they are better prepared to face change and complex challenges (Schmidt et al., 2011).

PBL is a practical approach to increase cognitive flexibility, especially in the context of Strategic Management courses. Although there are some challenges in implementation, the long-term benefits of PBL, including improved critical thinking, adaptive, and problem-solving skills, make it a method worthy of further development. This research aims to fill gaps in the literature by developing and testing PBL-based teaching modules specifically designed to increase students' cognitive flexibility in Strategic Management courses.

METHODS

This research uses the ADDIE development model. Hopefully, this research can produce a PBL-based Strategic Management teaching module that is effective and proven in increasing students' cognitive flexibility in Strategic Management courses.

The analysis stage aims to identify the needs and problems faced in teaching Strategic Management courses. Activities at this stage include analysis and gathering information through interviews with lecturers and students and surveys to understand gaps in current learning. At this analysis stage, a review of the Semester Learning Implementation Plan (RPS) and teaching materials used is also carried out to identify areas that require improvement and topics suitable for integration with PBL. Also, measurements are carried out through a pre-test to measure students' cognitive flexibility abilities and determine baseline data.

The design stage involves developing a framework and plan for PBL-based teaching modules. Activities at this stage include Determining Learning Objectives and setting specific, measurable, and relevant learning goals to increase cognitive flexibility. At the design stage, case studies and real pertinent problems to strategic management material are also developed and obtained from various sources. After designing interactive learning activities that encourage students to work in teams, discuss and solve problems.

The development stage focuses on creating and compiling the teaching modules that have been designed. Activities at this stage include writing teaching modules that include guides for lecturers, learning materials, case studies, and PBL activities. Validate teaching modules with strategic management material experts and learning media experts to obtain input and validation. After validation, input and suggestions received from experts and media validation are revised based on expert feedback to ensure the module's quality and relevance.

The implementation stage involves implementing the teaching module in the experimental class. This stage includes implementing PBL-based strategic management teaching modules in predetermined courses. Congratulations on the implementation process of the modules that have been created. Observations are made during the learning process to ensure that the teaching module goes according to plan and that the dynamics are recorded.

The evaluation stage aims to assess the effectiveness of the teaching module in increasing students' cognitive flexibility. Activities at this stage include a final test to measure students' cognitive flexibility after implementing the teaching module using the same test as the initial test. Next, the pre-test and post-test data will be analyzed to measure the increase in students' cognitive flexibility. Apart from that, researchers also collected feedback from students regarding their experiences with PBL-based teaching modules. After that, final revisions to the module will be carried out based on the evaluation results for further improvements.

This research uses data collection techniques through interviews, observations, and tests to measure cognitive flexibility. This research used interview techniques to collect

information from lecturers and students taking strategic management courses and observation techniques to record class dynamics and student participation during module implementation. Meanwhile, the cognitive flexibility test is used to measure changes in students' abilities related to cognitive flexibility.

Data from the cognitive flexibility test will be analyzed using descriptive and inferential statistics to identify significant differences between the pre-test and post-test. Feedback from students will be analyzed qualitatively to gain insight into their experiences and the effectiveness of the teaching modules in increasing students' cognitive flexibility.

By using the ADDIE model, this research is expected to produce PBL-based teaching modules that are effective and proven in increasing students' cognitive flexibility in Strategic Management courses.

This research was conducted on students of the 2021 office administration education study program who were divided into three classes and took management strategy courses. The product, in the form of a module that has been developed, is tested on students taking management strategy courses. This research uses observation sheets, documentation, and questionnaires to measure cognitive flexibility.

RESULT AND DISCUSSION

Results from the stage of ADDIE to develop module

Analysis

The analysis activity is carried out on the learning implementation plan for management strategy courses, starting from analysis, learning objectives, number of meetings, and the material students will study. A pre-test was conducted on all students taking management strategy courses to determine students' cognitive flexibility abilities.

Design

The researcher created a draft module with problem-based learning stages at this stage. Look for suitable cases to use as material for student discussion.

Development

At this development stage, open modules were created for lecturers to guide them on the learning process, learning process activities, case selection, and reflection activities in learning. Apart from that, validation is carried out by material experts and media experts at this stage. From the validation results, the two experts stated that the module that had been created was excellent and suitable for use. However, several entries need to be corrected regarding adding cases to the module by adding cases in educational organizations or schools.

Application

At this stage, trials have been conducted, and differences have been observed between the control and experimental classes. During the process, observations are made regarding the implementation module.

While implementing the PBL-based teaching module, researchers recorded important information obtained in the field. The results showed that students in the experimental class participated more actively in group discussions and presentations. Apart from that, student involvement in solving problems shows that students are more involved in problem-solving, asking critical questions, and offering creative solutions. They also carried out good teamwork when completing tasks in groups. This shows an increase in teamwork and communication between students.

Feedback was collected through questionnaires distributed and filled out by students in the experimental class. Several significant findings from the feedback provided by students regarding the learning experience were that most students felt that PBL-based learning was more exciting and challenging than conventional methods. Apart from that, in terms of skills obtained in the learning process, students have increased their critical thinking skills, problem-solving, and the ability to work in teams. From the case studies provided in

the module, according to students' opinions, they feel that the case studies used are relevant to real situations, helping students understand the practical application of strategic management concepts.

Student cognitive flexibility data is measured using validated and instrument validity and reliability tests. The pre-test and post-test results were analyzed to see the increase in cognitive flexibility abilities after implementing the PBL-based teaching module.

Table 1. Cognitive Flexibility Pretest and Post-test Results

Group	Pre-test	Post-test	Enhancement
Experimental Class	65.4	82.7	17.3
Control Class	66.1	70.5	4.4

Source: Processed Primary Data (2024)

Statistical analysis shows a significant increase in cognitive flexibility in the experimental class compared to the control class.

Inferential Statistical Analysis

A t-test was conducted on the pre-test and post-test results to determine the significance of increasing cognitive flexibility. Experimental Class: $t(29)=7.45$, $p<0.001$. Control Class that obtains the calculation results from $t(29)=1.98$,$p=0.065$. Apart from that, the t-test results showed that the increase in cognitive flexibility in the experimental class was statistically significant, while in the control class, it was insignificant.

Evaluation

Based on the evaluation results, the researcher made several revisions and improvements to the teaching modules tested in the case study by adding more variety to provide a wider variety and coverage of problems. In addition, improvements to the clarity of the discussion guide are more structured to assist students in analyzing and solving problems from the cases that have been prepared. In the assessment section, improvements were made to the assessment rubric to be more detailed to evaluate individual contributions in group work.

This study uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model to develop the PBL module. The ADDIE model provides a systematic and iterative structure, allowing continuous feedback-based improvement.

A study by Molenda (2003) the ADDIE model is a practical approach to instructional development because it provides a structured framework for designing and assessing instructional materials. This study strengthens these findings by showing that using the ADDIE model in PBL module development allows for better adjustments based on evaluation, ultimately improving cognitive flexibility. This is in line with research by Merrill (2002); Dick et al. (2005); Molenda (2003) States that module development with the ADDIE model can provide a practical and systematic framework for designing, developing, and evaluating PBL-based teaching modules and allows for continuous improvement based on feedback in testing the resulting product results.

The results of this research indicate that PBL-based teaching modules are effective in increasing students' cognitive flexibility in Strategic Management courses. The significant increase in the experimental class shows that the PBL approach can be a more effective teaching method than conventional methods. Students also provided positive feedback regarding their learning experience, indicating that this teaching module improved cognitive skills and motivated them to learn more actively and participatively.

The research results show that applying Problem-based Learning (PBL) teaching modules significantly increases students' cognitive flexibility in the strategic management course. The increase in the average post-test score in the experimental class (17.3 points) compared to the control class (4.4 points) indicates that PBL effectively develops stu-

dents' abilities to think flexibly, adapt to new situations, and integrate diverse information. This is in line with the findings Schmidt et al. (2011); Irwansyah & Perkasa (2022); Razak et al. (2022); Yuan et al. (2008). Which states that PBL can improve students' adaptive and problem-solving skills.

The application of PBL in the context of strategic management has been proven to make students more involved in the learning process. Observations show that students in the experimental class are more active in discussing, working in teams, and solving problems. This is consistent with research Savery (2006), which states that PBL can increase student involvement and understanding of learning material through a more realistic and applicable context.

Research by Hmelo-Silver (2004) These findings support that PBL can improve critical thinking skills and cognitive flexibility. Hmelo-Silver (2004), in his meta-analysis study, stated that PBL teaches students to think more adaptively and creatively when solving complex problems. This is in line with the results of this study, which show that PBL allows students to overcome challenges more innovatively and flexibly.

Feedback from students shows that they feel more challenged and motivated with a PBL-based learning approach. Most students report that PBL helps them develop critical thinking skills, problem-solving, and the ability to work in teams. This shows that apart from increasing cognitive flexibility, PBL has also succeeded in creating a more dynamic and collaborative learning environment. According to Savery (2006) PBL encourages more profound and meaningful learning because students are directly involved in the learning process and problem-solving.

Although PBL has proven effective, its implementation is not free from challenges. During the learning process, some students need help to adapt to methods that are more open and less structured than conventional methods. This is in line with the findings Hung (2011) which states that PBL requires adjustment and adaptation from both students and teachers. These challenges include more time for preparation and implementation and for lecturers to train to manage PBL classes effectively.

The results of this research have important implications for curriculum development in higher education, especially in management. Implementing PBL-based teaching modules can be an effective alternative to conventional teaching methods, especially in courses that require critical and adaptive thinking skills. A curriculum designed with a PBL approach in mind can help students be better prepared to face the complex and changing dynamics of the business world.

CONCLUSION

This research shows that PBL-based teaching modules effectively increase students' cognitive flexibility in Strategic Management courses. By increasing student engagement, motivation, and mental skills, PBL can be a better teaching method than conventional methods. However, implementing PBL requires careful preparation and adjustments to overcome existing challenges. The results of this research provide an essential contribution to developing teaching methods in higher education that are more adaptive and responsive to the needs of the dynamic world of work.

This research opens up opportunities for further research, especially regarding the long-term evaluation of PBL implementation. Future studies could examine whether the increase in cognitive flexibility achieved through PBL persists over time and how it impacts students' academic and professional performance after graduation. In addition, further research could explore the application of PBL in various other courses and educational contexts.

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