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APPLYING THE PDCA CYCLE IN THE MANAGEMENT OF MATHEMATICS TEACHING IN LOWER SECONDARY SCHOOLS: SOME THEORETICAL ISSUES

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ABSTRACT

In the context of implementing the 2018 General Education Curriculum, the management of Mathematics teaching in lower secondary schools requires a systematic, data-driven approach oriented toward continuous improvement. This article clarifies the theoretical basis for applying the PDCA cycle (Plan – Do – Check – Act) in the management of Mathematics teaching through document analysis, synthesis, and systematization. The findings show that PDCA is an effective management framework that enables teaching activities to be organized in a closed-loop cycle, ensuring coherence among planning, implementation, monitoring, and adjustment. Based on this, the study proposes the application of PDCA to the management of core components of Mathematics teaching, including objectives, content, methods, assessment, and supporting conditions. The application of PDCA contributes to improving management effectiveness, enhancing the adaptability of teaching activities, and promoting the development of students' mathematical competencies. It also provides a theoretical foundation for empirical research and educational policy formulation.

KEYWORDS: PDCA cycle, management, Mathematics, teaching, General Education Curriculum

1. INTRODUCTION

In the context of implementing the 2018 General Education Curriculum, Mathematics teaching at the lower secondary level is undergoing a strong shift toward competency development, which requires management practices to ensure systematicity, data-based decision-making, and continuous improvement [1]. However, practice shows that the management of teaching activities remains largely experience-based and lacks effective mechanisms for monitoring and adjustment, resulting in uneven quality across educational institutions.

In modern quality management, the PDCA cycle (Plan – Do – Check – Act) is regarded as a core tool for organizing and continuously improving processes [2]. Several studies in education have confirmed the effectiveness of PDCA in the continuous evaluation of curricula and the improvement of teaching methods, while also highlighting its important role in organizing and enhancing the quality of school management [3]. From a systems perspective, UNESCO also emphasizes that educational quality

assurance is a continuous process involving evaluation, monitoring, and improvement in order to enhance effectiveness and sustainability [4].

Nevertheless, the application of PDCA in the management of Mathematics teaching under the 2018 General Education Curriculum at the lower secondary level has not yet been fully and systematically studied. Therefore, it is necessary to conduct studies that clarify the theoretical basis and propose appropriate ways of application, thereby contributing to improving the effectiveness of teaching management and meeting the requirements of current educational reform.

2. RESEARCH CONTENT

2.1. Research Method

This article employs a theoretical research approach to establish the scientific basis of the topic through the analysis, synthesis, and systematization of documents related to the management of Mathematics teaching in lower secondary schools according to the PDCA cycle. On that basis, the study focuses on clarifying core issues, including the concept and application of the PDCA model in the management of Mathematics teaching at the lower secondary level.

2.2. Some Concepts

The management of Mathematics teaching in lower secondary schools refers to the principal's purposeful and planned influence on Mathematics teaching activities in order to form and develop lower secondary students' mathematical competencies.

This study uses the PDCA model as the main theoretical framework for analyzing and organizing management activities. PDCA is a cyclical quality management method that originated from Shewhart's ideas and was further developed and widely disseminated in modern management practice by Deming [5]. A distinctive feature of this model is its systematic nature and its capacity to promote continuous improvement through an iterative process consisting of four stages.

Planning (Plan) is the process of identifying a problem or an opportunity for improvement, analyzing its causes, determining objectives, and developing a specific action plan. An effective plan needs to clarify core elements such as objectives, content, time, location, implementing actors, and implementation methods [6]. At this stage, educational institutions identify teaching objectives and expected learning outcomes for students, while also analyzing students' entry characteristics and available resources in order to design teaching plans that are appropriate to the lower secondary curriculum and local context [1].

Implementation (Do) is the process of carrying out the plan in practice in association with the systematic collection of data for evaluation. Implementation may begin on a pilot scale in order to control risks before wider expansion. The plan is translated into specific activities such as organizing classrooms, assigning teachers, applying active teaching methods, utilizing digital learning resources, and enhancing experiential activities to promote students' initiative and creativity [7].

Checking (Check) is the process of measuring and analyzing implementation results and comparing them with the predetermined objectives in order to assess the level of achievement and identify deviations. This is a key step that provides data for adjustment and improvement [8]. Checking focuses on collecting information from learning outcomes, classroom observations, and feedback from teachers and students; thereby helping to promptly identify inadequacies and establish a data basis for continuous improvement [7].

Improvement (Act) is the process of standardizing and expanding effective solutions, while also analyzing limitations in order to adjust the plan for the next cycle, ensuring the continuity of teaching activities. Based on checking results, the school updates its plans, adjusts teaching methods, improves teaching conditions, and strengthens support for teachers in order to enhance learning quality and sustainably develop students' competencies [9].

2.3. Applying the PDCA Model in the Management of Mathematics Teaching at the Lower Secondary Level

2.3.1. Managing the Implementation of Mathematics Teaching Objectives at the Lower Secondary Level

The objectives of Mathematics teaching at the lower secondary level are determined according to a competency development orientation, aiming to form mathematical competencies and equip students with a system of fundamental knowledge and skills. These objectives cover core competencies such as mathematical thinking and reasoning, mathematical modeling, problem solving, and mathematical communication; they are also linked to content domains including numbers, algebra, geometry, statistics, and probability, as well as career orientation [10]. The objectives are concretized by grade level and topic, ensuring clarity, feasibility, and assessability.

Therefore, the management of objectives according to the PDCA cycle needs to ensure coherence among objective formulation, implementation, checking, and adjustment. At the planning stage, the principal directs the analysis of objectives based on curriculum requirements and concretizes them into assessment indicators. During implementation, the objectives are integrated into the school education plan, subject teaching plan, and lesson plans, ensuring consistency in implementation. Checking activities focus on the extent to which the objectives are realized through teaching content, methods, and learning outcomes. Improvement is carried out flexibly, in accordance with learners' characteristics and the teaching context, in order to meet the expected learning outcomes.

2.3.2. Managing the Implementation of Mathematics Teaching Content at the Lower Secondary Level

Teaching content is structured around three integrated strands of knowledge: Numbers and Algebra; Geometry and Measurement; and Statistics and Probability. This structure ensures systematicity, continuity, and applicability. The content is designed according to a competency development orientation and is integrated with practice and experiential activities to strengthen connections with real-life contexts [10].

Therefore, the management of teaching content needs to ensure consistency with objectives and implementation conditions. At the planning stage, the principal directs the development of subject education plans that are appropriate to the curriculum structure and learners' characteristics. During implementation, the content is delivered according to the planned schedule, in connection with professional assignment and subject-group meetings so that timely adjustments can be made. Checking activities focus on the extent to which the curriculum is implemented and on the balance between knowledge acquisition and application. Improvement of teaching content is carried out in the direction of streamlining, flexibility, and enhanced applicability.

2.3.3. Managing Teaching Formats and Methods in Mathematics at the Lower Secondary Level

Teaching formats and methods are implemented according to a learner-centered orientation and are appropriate to students' cognitive development. Teaching emphasizes the promotion of students' active participation through exploration and problem-solving activities; at the same time, it flexibly organizes various formats such as classroom teaching, experiential learning, project-based learning, and STEM integration [10].

Accordingly, the management of teaching formats and methods needs to ensure the effective transformation of objectives and content into learning outcomes. At the planning stage, the principal provides orientations for innovating teaching methods, diversifying teaching formats, and developing appropriate selection criteria. During implementation, teachers are directed to apply methods flexibly and combine teaching aids effectively; the school also organizes professional development and subject-group activities. Monitoring and supervision are conducted through classroom observations, focusing on the appropriateness of teaching methods and the level of student participation. Improvement aims to optimize the organization of teaching and expand effective practices.

2.3.4. Managing Assessment and Evaluation of Mathematics Learning Outcomes at the Lower Secondary Level

Assessment and evaluation are carried out according to a competency development orientation, combining formative and periodic assessment and using diverse methods and tools. The focus is on assessing competencies through evidence of thinking, reasoning, modeling, and problem solving, while ensuring comprehensiveness, objectivity, and continuity [10].

Accordingly, the management of assessment and evaluation needs to be implemented in order to provide feedback data for teaching improvement. At the planning stage, the principal directs the development of assessment plans and tools that are appropriate to the expected learning outcomes. During implementation, assessment activities are carried out according to the plan, with an emphasis on formative assessment and timely feedback. Checking activities focus on the appropriateness and reliability of assessment tools and the analysis of students' learning results. Improvement aims to refine assessment tools and use data to adjust and enhance teaching activities.

2.3.5. Managing the Supporting Conditions for Mathematics Teaching at the Lower Secondary Level

Teaching conditions need to be ensured in a coordinated manner, including the allocation of 140 periods per school year, a system of teaching equipment appropriate to the knowledge strands, and the enhancement of information technology application. At the same time, the use of self-made teaching equipment is encouraged in order to improve relevance and effectiveness [10].

Therefore, the management of supporting conditions for teaching is carried out to create a foundation for improving teaching quality. At the planning stage, the principal reviews existing conditions and develops plans for resource development. During implementation, the school provides teacher training and effectively utilizes available resources. Monitoring and supervision activities evaluate the extent of use and effectiveness of the supporting conditions. Improvement is conducted through supplementing and reallocating resources and refining coordination mechanisms, thereby ensuring effectiveness and sustainability.

3. CONCLUSION

Based on theoretical analysis and the systematization of relevant documents, this article has clarified the scientific basis for applying the PDCA cycle in the management of Mathematics teaching in lower secondary schools. The research findings affirm that PDCA is a systematic management framework that operates as an iterative cycle, allowing teaching activities to be organized, monitored, and continuously adjusted through the close linkage among four stages: planning, implementation, checking, and improvement.

The application of PDCA in the management of Mathematics teaching contributes to concretizing the requirements of the 2018 General Education Curriculum, while ensuring that the teaching process is implemented scientifically and consistently according to the issued standards. Through this approach, the principal has a basis for managing teaching activities based on data and evidence, promptly adjusting teachers' instructional organization and allocating educational resources in an effective manner, thereby contributing to improving the quality of Mathematics teaching in schools.

Core management components such as objectives, content, methods, assessment, and supporting conditions for teaching can all be organized according to the PDCA cycle. This helps ensure consistency, flexibility, and adaptability to the context of educational reform. However, the effectiveness of application depends on supporting conditions such as the principal's management capacity, the educational data system, and the quality culture within the school. It is also influenced by internal and external factors affecting the school; therefore, implementation needs to be carried out comprehensively and progressively.

The research findings provide a theoretical foundation for further empirical studies and for proposing appropriate management solutions, thereby contributing to orienting innovation in the management of Mathematics teaching at the lower secondary level in the current context.

REFERENCES

- [1] Ministry of Education and Training. (2018). *General Education Curriculum – General Curriculum*.

- [2] Shi, L., & Cheng, E. C. (2021). Developing metacognitive teaching in Chinese language through conducting lesson study in Shanghai. *International Journal for Lesson and Learning Studies*, 10(1), 75–88.
- [3] Pawaka, W., & Sobari, S. (2026). Strengthening discipline culture through digital innovation: Managerial readiness and PDCA implementation. *Journal of Innovation and Research in Primary Education*, 5(2), 2263–2274.
- [4] Nguyen, N. T., Van Thai, T., Tuan, D. A., Nguyen, H. T., Van Vinh, L., & Trung, T. D. (2023). Model of quality assurance management in general education: A case study in Nghe An province, Vietnam. *Synesis*, 15(3), 431–449.
- [5] Deming, W. E. (1986). Principles for transformation. In *Out of the Crisis* (pp. 18–96).
- [6] Koontz, H., & Weihrich, H. (1992). *Management: A global perspective*. McGraw-Hill.
- [7] Huan, C. W., & Nasri, N. M. (2022). Teacher teaching practices based on the PDCA model: A systematic literature review. *International Journal of Academic Research in Progressive Education and Development*, 11(3), 542–553.
- [8] Tran Dang Khoi. (2005). *Some issues in educational management*. Education Publishing House.
- [9] Chau Thi Kim Ngan, & Nguyen Thi Hong Suong. (2024). Applying the PDCA cycle in managing Mathematics teaching under the 2018 General Education Curriculum in primary schools. *Journal of Educational Equipment*, 2(307), 273–275.
- [10] Ministry of Education and Training. (2018). *General Education Curriculum for Mathematics* issued together with Circular No. 32/2018/TT-BGDDT dated December 26, 2018.