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PDCA IN EDUCATIONAL QUALITY CONTROL (Concept, Stages and Implementation in Educational Institutions)

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ABSTRACT

PDCA (Plan-Do-Check-Act) is a quality management cycle developed by W. Edwards Deming based on the basic concepts of Walter Shewhart. In the educational context , PDCA is an important instrument to ensure continuous improvement of the quality of educational services . This article analyzes the concept of PDCA, its implementation stages , and practical applications in educational institutions . Through a literature study approach and conceptual analysis , this study shows that the integration of PDCA in the educational quality assurance system can create a systematic , data - based , and adaptive control mechanism to changing stakeholder needs . The implementation of PDCA not only improves the quality of the learning process but also builds a sustainable quality culture in educational institutions .

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INTRODUCTION

The era of globalization and rapid digital transformation has fundamentally changed the educational landscape . Educational institutions face critical challenges not only in adapting to these changes but also in leveraging them as a catalyst for qualitative improvement . (Harahap and Fauzi, 2020). In this context , the need for a systematic and holistic quality management approach is urgent to ensure competitive educational services . Educational quality is a multidimensional aspect involving the complexity of teaching and learning processes , institutional management , and stakeholder satisfaction . Various quality assurance systems have been developed , including the Internal Quality Assurance System (SPMI), the System (Haryanto and Istikomah , 2020).

External Quality Assurance (SPME), to international standards such as ISO 9001:2015. All of these systems essentially share the same ultimate goal : continuous quality improvement . One of the most fundamental methodologies in quality management is the PDCA (Plan-Do-Check-Act) cycle , also known as the Deming Cycle or Shewhart Cycle. This methodology provides a four- step framework designed to improve processes through iterative testing , learning , and refinement . In the educational context , PDCA has proven effective in improving curriculum design , teaching methods , student assessment , and the overall educational management process . This article aims to comprehensively examine the PDCA concept in educational

quality control , describe its implementation stages , and analyze its practical application in educational institutions . Considering the complexity of the challenges facing modern educational institutions , a thorough understanding of PDCA is essential for building a responsive and adaptive quality system, (Bichun, and Qifa, 2021)

LITERATURE REVIEWE

PDCA Concept

History and Evolution of PDCA

The PDCA cycle has deep historical roots in the development of quality management . The basic concept of this cycle was first introduced by Walter A. Shewhart in 1939 in his work, Statistical *Method from the Viewpoint of Quality Control* . Shewhart proposed a scientific learning cycle consisting of three steps : specification , production , and inspection . However , the systematic development and popularization of this methodology was carried out by W. Edwards Deming, a statistician who played a key role in the revitalization of Japanese industry after World War II, (Chen, 2007).

Deming modified Shewhart's concept into a more comprehensive four - step cycle : Plan-Do-Check-Act. Initially , Deming used the term PDSA (Plan-Do-Study-Act), but as time went on , the term PDCA became more dominant in quality management literature . The change from "Study" to "Check" reflects the emphasis on the verification and measurement aspects of the quality improvement process, (Crosby, 1979).

Over time , awareness of PDCA's universal effectiveness in managing and improving processes spread this methodology to various fields , including education . From the late 20th century to the early 21st century , the education community began to pay greater attention to quality assurance , continuous improvement , and outcome - based evaluation . Educational institutions began to seek effective ways to improve the quality of teaching , enhance student learning outcomes , and meet the growing demand for external assessment and accreditation, (Deming, 1986).

Basic Philosophy of PDCA

The PDCA philosophy is based on the fundamental principles of total quality management (TQM). According to Deming, quality improvement is not a one- time activity , but rather a continuous , iterative process . This cycle reflects systemic thinking that integrates planning , execution , evaluation , and follow- up into a single , interconnected whole . Kernoth (2020) explains that PDCA provides a structured approach for teams to test hypotheses , learn from experience , and make informed changes . This iterative process not only helps improve the quality of output but also supports a culture of continuous improvement , thus driving organizational success, (Elken, Gornitzka, Maassen and Vukasovic, 2020).

In the educational context , the PDCA philosophy aligns with the concept of *reflective practice* developed by Donald Schön (1987). Reflective educational practitioners use a cycle of experience , reflection , and action to improve their pedagogical practice . PDCA provides a

systematic framework for reflecting on and continuously developing teaching practice, (Harahap and Fauzi, 2020).

Differences between PDCA and Other Quality Management Approaches

PDCA has unique characteristics that distinguish it from other quality management approaches such as Six Sigma or Lean Management. While Six Sigma emphasizes variation reduction and defect elimination through a rigorous statistical approach , and Lean Management focuses on waste elimination , PDCA offers a more flexible and adaptive framework for general process improvement, (Ishikawa, 1985).

The strength of PDCA lies in its simplicity and universality . This methodology can be applied at various scales , from micro- level operational process improvement to macro - level strategic transformation . In education , this flexibility is invaluable given the diversity of institutional contexts and the unique needs of each educational institution, (Juran, 1988).

STAGES IN THE PDCA CYCLE

The PDCA cycle consists of four interrelated , continuous stages . Each stage has a specific function and output that becomes input for the next stage , creating a virtuous cycle that drives continuous quality improvement, (Li, 2012).

Planning Stage

The Plan stage is the foundation of the entire PDCA cycle . In this stage , educational institutions identify problems or areas that need improvement , analyze historical and contemporary data , and formulate action plans that are measured and measurable . Key activities in this level include :

a. Problem Identification and Situation Analysis
   The process begins with identifying discrepancies or opportunities for improvement in the educational process . Analytical techniques such as fishbone (Ishikawa) diagrams, SWOT analysis, or Pareto analysis can be used to identify root causes . Collected data and information include learning evaluation results , stakeholder feedback, institutional performance indicators , and benchmarks against quality standards .
b. Determining Goals and Targets
   Based on the situation analysis , quality improvement objectives are formulated in a specific , measurable , achievable , relevant , and time- based (SMART) manner. Targets must align with the vision , mission , and strategy of the educational institution , and take into account the limitations of available resources .
c. Planning and Methods
   This stage involves designing an implementation strategy , allocating resources (human , financial , infrastructure), determining data collection methods , and establishing success indicators . Planning also includes determining responsibilities and a timeline for implementation.

d. Risk Identification and Mitigation
In accordance with ISO 9001:2015 principles , the planning stage must consider potential risks and opportunities . Risk analysis helps institutions prepare alternative scenarios and proactive mitigation strategies .

In an educational context , the Plan stage can be applied to designing a new curriculum , planning a lecturer competency development program , or designing a more effective learning evaluation system . Charles Sturt University, for example , uses this planning stage to design a 5-7 yearly curriculum review cycle aligned with Australian Tertiary Education Quality and Standards Agency (TEQSA) standards, (Mussawy, 2020).

Do (Implementation) Stage

The Do phase is the implementation of the plan that has been prepared . In the educational context , this phase involves the execution of learning programs , the implementation of quality policies , or the implementation of institutional development programs, (Patel, 2017). Important characteristics of the Do phase include :

a. Implementasi Terukur
Implementation must follow the procedures established in the Plan stage with good documentation . All activities , resource use , and intermediate results are systematically recorded for evaluation purposes .
b. Implementation Approach
In education , implementation is often done through a pilot or prototyping approach , where changes are tested on a small scale before mass implementation . This approach allows for the identification of operational issues without significant risk to the entire education system .
c. Training and Capacity Development
The success of the Do phase depends heavily on the competence of the implementers . Training programs for lecturers , educational staff , and management are essential prerequisites . Xi'an Peihua College in China, for example , emphasizes the development of adequate laboratories and workspaces and the appointment of lecturers with practical experience to support the implementation phase .
d. Process Documentation
The entire implementation process is documented in detail , including deviations from the plan and any adjustments made . This documentation forms the basis for analysis in the Check phase .

Check Level (Inspection)

The Check phase is the process of evaluating and analyzing implementation results against established targets . This phase is crucial for determining the effectiveness of corrective actions and identifying areas that still require attention, (Sangpikul, 2017). Activities in the Check phase include :

a. Data Collection and Analysis
Performance data is collected through various methods : learning outcome evaluations, stakeholder satisfaction surveys , statistical analysis of quality indicators , internal

audits, and process reviews. Data is analyzed quantitatively and qualitatively to identify gaps between targets and actual outcomes .

b. Evaluasi Terhadap Target
Implementation results are compared with the targets set in the Plan phase . Variance analysis is conducted to understand the factors that contributed to the success or failure of target achievement .

c. Identify Best Practices and Areas of Improvement
This stage also identifies best practices that can be standardized as well as areas that still need improvement . Feedback from students , faculty , and industry partners provides valuable input for a comprehensive evaluation .

d. Process Review
The implementation process itself is reviewed to identify inefficiencies , bottlenecks , or gaps in implementation . This review involves analyzing workflow, communication , and coordination between units.

In practice , Charles Sturt University uses annual course-level health checks, where student performance data and feedback are regularly analyzed to monitor the academic health of a program . Similarly , Xi'an University of Science and Technology uses a monitoring system involving the Academic Steering Committee , Quality Control Unit , and Teaching Supervision Group to collect and analyze teaching information in real time, (Schön, 1987).

Act Level

The Act phase closes the cycle and also opens the next cycle . Based on the evaluation results from the Check phase , corrective , preventive , or improvement actions are taken to standardize success or address failure . The Act phase components include :

a. Standardization of Success
If the implementation is successful , best practices are standardized through updated procedures , policies , or operational manuals . Lessons learned are documented for future reference .

b. Corrective and Preventive Actions
For areas that do not meet targets, a root cause analysis is conducted to determine corrective actions . Preventive actions are also formulated to prevent recurrence of similar problems in the future .

c. Planning the Next Cycle
Based on insights from the evaluation , a plan for the next PDCA cycle is developed . New targets are set , strategies are adjusted , and resources are reallocated . This cycle is continuous , reflecting the principle of *continuous improvement* (Kaizen).

d. Reward and Sanction System
Educational institutions need to develop effective reward and punishment systems to motivate continuous improvement . Recognition of units or individuals who successfully achieve quality targets , as well as consequences for those who fail , are part of the Act's mechanisms .

The Act phase also includes aspects of ongoing capacity development . Faculty and staff are encouraged to engage in self -reflection and ongoing professional development to ensure innovation and relevance of pedagogical practices, (Shewhart, 1939).

IMPLEMENTATION OF PDCA IN EDUCATIONAL INSTITUTIONS

Context of Implementation in Indonesian Higher Education

Indonesia faces significant challenges in improving the quality of higher education . Data shows that only two Indonesian universities are included in the world rankings, and Indonesia's innovation and higher education indexes rank below the global middle class . Indonesian educational institutions still receive a C- grade accreditation , particularly for private universities . These challenges include the quality of the teaching staff , with a low number of professors and doctors , limited learning facilities , and an excessively heavy academic load .

In this context , the implementation of PDCA becomes relevant to align various existing quality assurance systems : SPMI (Internal Quality Assurance System), SPME (External Quality Assurance System), ISO 9001:2015, SPIP (Government Internal Control System), and SAKIP (Government Agency Performance Accountability System). These systems can essentially be integrated because they share the same ultimate goal : continuous quality improvement, (Tarumingkeng, 2025)

Multi-Level Implementation Model

The implementation of PDCA in educational institutions is effectively carried out through a multi-level approach that includes three perspectives : institutional level , faculty / department level , and individual level (lecturer / student).

Institutional Level (University-Wide)

At the institutional level , PDCA is implemented to develop a macro quality system . The organizational structure that supports this includes :

- Academic Steering Committee
  Responsible for adjusting the structure of study programs , reviewing program arrangements , reviewing teaching plans and syllabi , and approving teaching reform projects .
- Quality Control Department
  A unit under the Rectorate that manages the task of monitoring the quality of teaching , including scheduling , inspections , and feedback.
- Teaching Supervisory Group
  Conduct supervision and inspection of teaching quality , problem identification , and coaching of young lecturers .
- Evaluation Section: Responsible for institutional evaluation and accreditation processes
- Faculty Level Quality Assurance Unit
  Controlling the quality of second- level teaching units .

Implementation of PDCA at this level includes establishing clear teaching objectives , establishing complete regulations and quality standards , organizing teaching activities , collecting teaching information through various methods (inspection , supervision , student assessment), scientific evaluation of teaching quality , and establishing a reward and punishment system, (Zakharova, 2025).

Faculty / Department Level

At the faculty or department level , PDCA is directed at developing specific competencies and curriculum innovation . Implementation includes :

- Plan
  Establish long -term goals for improving students' innovative practical abilities , planning resource allocation (funds, facilities , personnel), developing interdisciplinary curricula , building internal and external practice platforms .
- Do
  Carrying out the construction of laboratories and work spaces , appointing lecturers with practical experience , establishing cooperation with industry .
- Check
  Evaluate the effectiveness of innovative courses and practical projects , gathering feedback from students , faculty , and industry partners .
- Act
  Adjust resource allocation , curriculum content , and teaching methods ; optimize practice platforms and collaborative projects ; carry out continuous improvement
  .

Individual Level (Lecturers and Students)

At the individual level, PDCA is internalized in teaching and learning practices :

Lecturer's Perspective :

- Plan
  Formulate specific teaching objectives , select appropriate teaching methods and practical activities , update course content according to market trends .
- Do
  Conduct project- based teaching , provide guidance and technical support , encourage exploration of new design concepts .
- Check
- Providing feedback and evaluation of student learning outcomes , conducting teaching reflection and self -evaluation , collecting student feedback .
- Act
  Adjusting teaching methods and arrangement of practical activities , updating teaching content and methods , continuing professional development
  .

Student Perspective

PDCA can also be internalized by students for independent learning management . Students plan competency targets , carry out learning activities , evaluate achievements , and adjust learning strategies .

PDCA Implementation Case Study

Charles Sturt University, Australia

Charles Sturt University implements PDCA through a "6-Stage Cycle for Continuous Improvement" system integrated into its Curriculum Management System (CourseLoop /CDAP). This cycle includes two sub- cycles : a review, design , and accreditation cycle (5-7 years) aligned to TEQSA standards , and an annual continuous improvement cycle that includes course- level design , LMS development, delivery , post-session course - level reviews , and an annual course- level health check.

Xi'an Peihua College, China

The institution has developed a comprehensive teaching quality monitoring system through the Research and Development Department , the Administration Department , and the Academic Department. The Development Planning Department identifies areas for improvement and sets goals , the Academic Management Center implements improvement measures , the Teaching Supervision Office evaluates the results , and adjustments are made for the next cycle .

Ministry of Health Polytechnic of Bengkulu, Indonesia

Research at the Bengkulu Ministry of Health Polytechnic of Health demonstrates the importance of synchronizing SPMI, SPME, ISO 9001:2015, SPIP, and SAKIP. Implementing PDCA within the context of ISO 9001:2015 with risk-based thinking has proven effective in improving sustainable quality management systems . The results demonstrate improved institutional performance , as reflected in the annual LAKIP (Government Agency Performance Accountability Report).

Implementation Challenges and Mitigation

The implementation of PDCA in education faces various challenges :

1. Resistensi Perubahan (Change Resistance)
   A conservative academic culture often creates resistance to systematic change . Mitigation is achieved through outreach , training , and demonstration of the tangible benefits of PDCA.
2. Complex Documentation
   The PDCA system requires intensive documentation . The solution is the development of an integrated quality management information system and the automation of the documentation process .
3. Limited Resources
   Educational institutions often face budget and personnel constraints . Prioritizing areas for improvement based on risk and impact analysis is an effective strategy .
4. Fragmentation of Quality Systems
   The multiplicity of quality systems (SPMI, SPME, ISO, etc.) can lead to redundancy . An integrative approach with PDCA as a unifying framework is recommended .

Benefits and Advantages Of PDCA in Education

Implementation of PDCA in controlling educational quality provides various strategic benefits:

Systematic and Continuous Improvement

PDCA ensures that quality improvement is not a one- time project , but rather a continuous process integrated into the institution's operations . Each cycle generates learning that informs the next , creating a spiral of quality improvement .

Data- Driven Approach

The Check stage encourages the use of data and empirical evidence in decision -making . This reduces subjectivity and bias in quality evaluations and ensures resource allocation based on measurable priorities .

Flexibility and Adaptability

The iterative nature of PDCA allows educational institutions to be responsive to changing stakeholder needs , technological developments , and job market dynamics . Curriculum and teaching methods can be adjusted regularly based on feedback .

Improving Innovative Competence

In the context of art and design education , PDCA has been proven effective in enhancing students' practical innovative abilities through the cycle of planning , implementing , evaluating , and adjusting design projects .

Strengthening Quality Culture

Continuous implementation of PDCA builds a quality culture across all levels of the organization . Internal and external stakeholders become accustomed to reflective , improvement -oriented practices.

Compliance and Accreditation

PDCA provides a structured mechanism for meeting regulatory and accreditation requirements . Documentation of the PDCA cycle provides objective evidence of quality assurance required for external audits .

CONCLUSION AND RECOMMENDATIONS

Conclusion

PDCA (Plan-Do-Check-Act) is a fundamental and applicable quality management methodology in the educational context . As an evolution of Shewhart's concept developed by Deming, PDCA provides a systematic framework for continuous improvement that is essential in facing the complex challenges of modern education . The implementation of PDCA in

educational institutions involves four integrated stages : comprehensive planning based on data analysis and risk identification ; measured implementation with a piloting approach and capacity building ; rigorous inspection through multi- source evaluation and variance analysis ; and proactive action to standardize success and correct failure .

The application of PDCA at the institutional , faculty , and individual levels has proven effective in various international contexts , from Charles Sturt University in Australia and Xi'an Peihua College in China to Poltekkes in Indonesia. Successful implementation depends on leadership commitment , adequate resource allocation , integrated information systems , and the development of a sustainable quality culture .

Recommendation

Based on the analysis of PDCA implementation in controlling educational quality , it is recommended :

1. Quality System Integration : Educational institutions in Indonesia need to integrate SPMI, SPME, ISO 9001:2015, and other quality systems within a unified PDCA framework to avoid redundancy and fragmentation .
2. Capacity Development : Investment in training and development of human resource competencies and quality of education is an essential prerequisite for the effectiveness of PDCA.
3. Technology Adoption : Implementation of a quality management information system (QMS) that supports PDCA cycle automation , real-time data collection , and predictive analysis .
4. Participatory Approach : Involving all stakeholders (lecturers , students , education staff , industrial partners) in the PDCA cycle to ensure a sense of ownership and responsiveness to actual needs .
5. Contextualization : Adapting the PDCA model to the specific characteristics of the institution , field of study , and local context , avoiding one-size-fits-all applications .
6. Continuous Monitoring and Evaluation : Develop a measurable and integrated quality performance indicator (KPI) system within the PDCA cycle to ensure accountability and transparency .
7. Research and Development : Encourage empirical research on the effectiveness of PDCA in various Indonesian educational contexts to build a robust contextual model .

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