

Research Article

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Development of Pedagogical Content Learning Module in Enhancing Pedagogical Competence of Economics Teachers

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Abstract

Background/purpose. Teachers' pedagogical competence in Indonesia has become one of the central issues in improving the quality of national education. This issue can affect students' academic achievements and influence education quality. This study aims to explore the need to develop a new pedagogical module tailored to current educational challenges that can significantly enhance teachers' pedagogical competence.

Materials/methods. This developmental research adopts a methodological approach based on operational research using the Design-Based Research (DBR) framework.

Results. The findings reveal that the use of the Pedagogical Content Learning (PCL) module significantly improves teachers' pedagogical competence, as evidenced by the differences in the mean scores of the pre-test and post-test. Statistical analysis using a t-test indicates a significant increase in pedagogical competence scores after implementing the module, while the Effect Size test demonstrates a substantial impact of the module on enhancing teachers' pedagogical skills.

Conclusion. These findings suggest that the development of the PCL module not only contributes positively to the pedagogical competence of economics teachers but also has the potential to improve overall educational quality. The module enables teachers to connect economic materials with real-life contexts, fostering the development of critical thinking skills and digital literacy. Thus, the PCL module serves as an effective tool to assist teachers in addressing the complexities of 21st-century education.

1. Introduction

Teachers' pedagogical competence in Indonesia has been a major issue in the development of national education quality. Several studies indicate that the level of teachers' pedagogical competence in Indonesia remains low (Azizah et al., 2024; Bhakti & Maryani, 2017; Haenilah et al., 2023; Mashoedah, 2015; Prawira & Nugraha, 2021). This finding is further corroborated by the results of the Teacher Competency Test (UKG) conducted by the government, which revealed that the majority of teachers have not yet achieved the expected pedagogical competence standards (Dapodik Kemendikbud, 2019). The UKG results show that the quality of teachers is still below the established minimum standard, which is considered low. This condition affects students' academic achievements and ultimately influences the overall quality of education in Indonesia.

The UKG is an evaluation designed to measure teachers' competencies by assessing their mastery of pedagogical and professional skills. The evaluation includes teachers' ability to design learning strategies for students, effectively manage classrooms, demonstrate in-depth knowledge of the subjects they teach, and assess the learning process (Indartiningsih, 2023; Wijaya et al., 2021). According to the Programme for International Student Assessment (PISA), in 2012, Indonesia ranked 66th out of 81 countries (OECD, 2023). Similarly, a survey by the Political and Economic Risk Consultant (PERC) placed Indonesia's education quality at the bottom rank, 12th out of 12 Asian countries (Indartiningsih, 2023). The issue of low pedagogical competence is not unique to Indonesia. Countries like Lebanon, San Marino, and Fiji have minimum academic qualifications for teachers but lack adequate pedagogical training (Global Education Monitoring Report, 2023). This highlights that the issue of pedagogical competence is a cross-border challenge, as teachers worldwide face similar difficulties in developing the skills necessary to meet the demands of 21st-century education.

To enhance teachers' pedagogical competence, the Ministry of Education, Culture, Research, and Technology has provided pedagogical modules accessible through the Continuous Professional Development Management Information System (Sistem Informasi Manajemen Pengembangan Keprofesian Berkelanjutan or SIM PKB). These modules are designed to assist teachers in understanding and applying sound pedagogical principles in their teaching practices. However, recent evaluations reveal that these modules are no longer relevant to the current developments in education. Structurally, the modules are considered poorly organized, making them difficult for teachers to follow effectively. Additionally, the content of the current modules fails to address the needs and challenges of modern education, given the rapid advancements in technology and the increasing complexity of teaching methods. Histogram data on module utilization indicates that most teachers struggle to comprehend and implement the material, signaling the ineffectiveness of these modules as a professional development resource.

Consequently, there is an urgent need to update the existing pedagogical modules. These updates should consider the dynamics of modern education, including the integration of technology in teaching, the application of project-based learning, and the development of critical thinking and collaborative skills. A more systematic and relevant module is expected to enhance teachers' pedagogical competence, ultimately improving classroom teaching quality and student learning outcomes. This study aims to explore the need for developing a new pedagogical module tailored to the challenges of modern education and capable of significantly improving teachers' pedagogical competence.

Based on these objectives, this research makes a significant contribution to formulating solutions to the problem of low pedagogical competence of teachers in Indonesia. By exploring the need to develop a pedagogical module that is more in line with current educational dynamics, this research has the potential to produce more systematic and relevant module development recommendations. The new module is expected to not only fulfill the demands of pedagogical competence but also

accommodate the use of technology, project-based learning, and the development of critical and collaborative thinking skills. The contribution of this research is expected to improve the quality of education in Indonesia by increasing the capacity of teachers in designing and implementing learning that is more effective, innovative and responsive to the challenges of global education.

2. Literature Review

2.1. Pedagogical Competence of Teachers

Pedagogical competence refers to a teacher's ability to design, manage, and evaluate learning effectively (Aimah et al., 2017; Khanal et al., 2024; Moreira, Arcas, Sánchez, García, & Melero, 2023; Olagunju & Iwintolu, 2023; Setiawan et al., 2025; Siswanti & Sularso, 2024). It reflects a teacher's skill in integrating various resources to achieve learning efficiency (Kapasheva et al., 2024; Loureiro et al., 2024; Madhavaram & Laverie, 2010; Mariscal et al., 2023; Panakaje et al., 2024). In economics education, pedagogical competence includes learning models, the use of media and technology, learning assessment, lesson planning, and teachers' self-efficacy in teaching (Olsson & Roxå, 2013). This competence is closely related to the quality of teaching and its impact on students' understanding.

Baumert et al. (2010) and König et al. (2011) explained that pedagogical competence consists of several key components, including classroom management, teaching methods, learning assessment, lesson planning, and adaptive teaching. Classroom management involves organizing interactions in the classroom and ensuring effective use of time (Chow et al., 2024; Mitchell et al., 2017). Teaching methods include strategies tailored to the subject matter and students' characteristics (Mustafa, 2022). Learning assessment refers to understanding various formative and summative assessment techniques (Gezer et al., 2021; Ismail et al., 2022; Stanja et al., 2023). Lesson planning focuses on systematically organizing learning objectives and strategies, while adaptive teaching emphasizes a teacher's ability to adjust teaching methods according to the diverse needs of students (Rincon-Flores et al., 2024). By understanding these aspects, teachers can enhance the quality of their teaching and facilitate more meaningful learning experiences for students.

2.2. Pedagogical Competence in 21st-Century Learning

In modern education, pedagogical competence is not only limited to mastering teaching theories but must also support 21st-century skills, which include Critical Thinking, Communication, Collaboration, and Creativity, known as the 4Cs (Trilling & Fadel, 2009). High school economics teachers are required to implement learning models aligned with these concepts, such as Project-Based Learning, Problem-Based Learning, and Design-Based Learning (Pacific Policy Research Center, 2010).

21st-century skills directly impact learning strategies, assessments, and the use of technology in the classroom. Teachers with 21st-century pedagogical competence must be able to integrate technology into learning and apply innovative approaches to delivering subject material (Siregar, 2020). Therefore, enhancing teachers' pedagogical competence to address the challenges of modern education is essential.

2.3. Pedagogical Content Learning (PCL) Module as a Media for Developing Pedagogical Competence

As part of efforts to improve teachers' competence, this study applies the concept of Pedagogical Content Learning (PCL) as a tool for independent learning. PCL is a module that integrates Pedagogical Content Knowledge (PCK) into economics education, aiming to help teachers understand and implement more effective teaching methods (Suharto et al., 2022).

The PCL module is designed to support teacher learning through key components, including learning objectives, pedagogical teaching materials, cognitive tests, psychomotor tests, and affective tests. The learning objectives in this module provide an overview of the expected outcomes. The pedagogical teaching materials offer theories and practices that can be applied to economics subjects. Cognitive tests measure teachers' understanding of pedagogical concepts, while psychomotor tests assess their ability to design and implement economics lessons. Additionally, effective tests evaluate teachers' interaction and collaboration in applying pedagogical concepts. With the PCL module, teachers are expected to independently enhance their pedagogical competence without solely relying on formal training.

2.4. Theoretical Framework

In the context of education, especially in the teaching profession, the ability to organize and monitor the self-learning process is crucial, given the demands to continuously improve the quality of teaching and master new skills along with the times. The Self-Regulated Learning (SRL) theory serves as the foundation for developing the PCL module, as it allows teachers to learn independently and continuously (Schunk, 1989; Siegler & Richard, 2017; Zimmerman, 1989). SRL consists of three main elements: learning strategies, self-efficacy, and academic commitment. Learning strategies refer to the actions and processes teachers use to acquire knowledge and skills. Self-efficacy describes teachers' confidence in developing their competencies. Academic commitment emphasizes the willingness to continue learning and improving teaching skills. According to Pintrich et al. (2000), SRL also includes aspects such as planning, strategy selection, resource allocation, and emotional and motivational control. Teachers with SRL skills can be more flexible in determining learning methods that suit their needs. This study adopts the SRL approach to help teachers enhance their pedagogical competence through the PCL module. With independent learning strategies, teachers can more effectively develop teaching methods that meet students' needs.

The PCL module is also based on the Pedagogical Content Knowledge (PCK) theory, first introduced by Shulman (1986). PCK refers to the combination of pedagogical knowledge and subject matter understanding, enabling teachers to deliver lessons effectively according to students' needs (Jones & Moreland, 2015). PCK theory is used to support SRL theory because they complement each other in developing teachers' ability to learn and teach effectively.

The PCK model used in this study follows the five key components outlined by Magnusson, Krajcik, & Borko (1999): knowledge of assessment, knowledge of curriculum, knowledge of instructional strategies, knowledge of students' understanding, and orientations to teaching. Knowledge of assessment relates to teachers' understanding of effective evaluation methods. Knowledge of curriculum reflects their ability to design a curriculum that aligns with educational standards. Knowledge of instructional strategies refers to selecting appropriate teaching methods to enhance students' understanding. Knowledge of students' understanding focuses on analyzing students' learning abilities and difficulties. Meanwhile, orientations to teaching emphasize the development of innovative teaching approaches. By integrating these theoretical foundations, the PCL module aims to support teachers in developing their pedagogical competence effectively.

3. Methods

This developmental research adopts an operational research methodology, employing a design-based research (DBR) approach to develop a Pedagogical Content Learning (PCL) module aimed at enhancing the pedagogical competence of high school economics teachers in the 21st century. DBR is a type of research conducted collaboratively between researchers and practitioners to systematically analyze, design, and evaluate solutions to educational problems through iterative cycles (Reeves, 2006).

The researcher's task is to design and develop a product that will enhance the pedagogical competence of teachers. The practitioners referred to here are education practitioners, specifically selected economics teachers who have scored well in the UKG and are also recognized as "guru penggerak". These practitioners play a role in providing input based on their classroom experience so that the developed product can be effectively implemented in teaching. The criteria used in selecting the practitioners are the scores and rankings of the Economics UKG in DKI Jakarta, which led to the selection of economics teachers as collaborators in the DBR study. Meanwhile, experts, including those in Linguistics, Accounting Education, Learning Assessment, and Digital Information Technology, validate the developed product by providing scientific and technical opinions to ensure that the product meets the quality standards in line with existing educational theories. The collaboration between these three parties aims to produce a product that is effective in improving the pedagogical competence of economics teachers.

The Design-Based Research (DBR) procedure in this study follows the framework outlined by Reeves (2006), which consists of four stages:

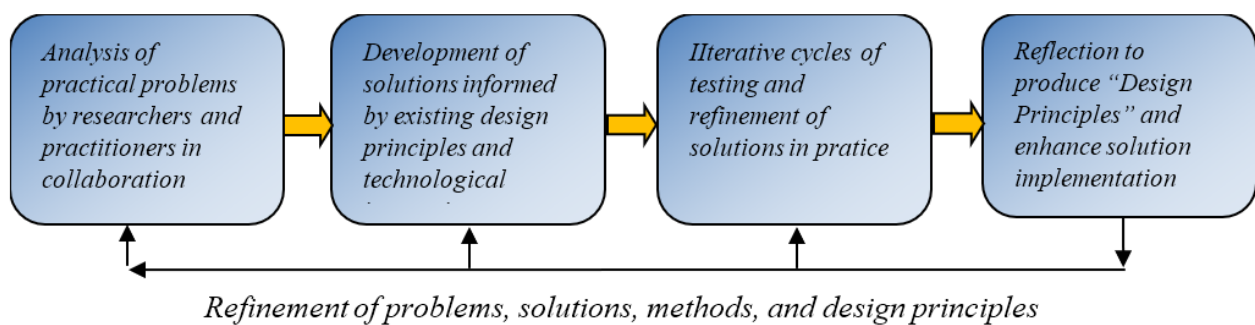


Figure 1. Phases of Design-Based Research Implementation

Source: (Amiel & Reeves, 2008 p. 35)

4. Results

4.1. Validity Test

The validity test was conducted using qualitative descriptive data analysis techniques by experts in Linguistics, Accounting Education, Learning Assessment, and Digital Information Technology. Table 1 below summarizes the expert validation results.

Table 1. Validation of pedagogical content learning modules by experts

Product	Experts	Improvement Input
Modul PCL	Linguistics	<ul style="list-style-type: none"> • The center point illustration is not interesting • The illustration does not reveal the character of the object. • Illustrations in the module are not contextual. • Illustrations are not accurate and proportional
	Accounting Education	<ul style="list-style-type: none"> • Accounting materials need to be adjusted to current phenomena • Psychomotor tests need to pay attention to the scope of the material at the time of the test.
	Learning Assessment	<ul style="list-style-type: none"> • Alternative answers on cognitive tests need to be sharpened. • Pedagogical themes on cognitive tests need to be adjusted in terms of the characteristics of the independent curriculum. • Integration of economic material on psychomotor tests needs to be adjusted to the environmental conditions of students.
	Digital Information Technology	<ul style="list-style-type: none"> • The instructions for using the module should be presented in the form of a flowchart • The design at the beginning of the module should be communicative and present the systematics of the module. • The design for cognitive, affective, and psychomotor tests needs illustrations that are in accordance with the nature of the test. • The design at the end of each module must be able to present a recap of the tests conducted by the teacher, as well as providing success categorization and feedback for module users.

4.2. Limited Product Testing

A limited trial involving 20 economics teachers was conducted to implement the PCL Module. The objective of this trial was to produce a PCL Module capable of enhancing teachers' pedagogical competence in line with the demands of 21st-century education. The product testing was carried out in several iterative cycles until it demonstrated its effectiveness in improving the pedagogical competence of economics teachers.

Table 2. Comparison of Trial Results in Cycle 1 and Cycle 2

Cycle 1	Cycle 2
The results indicate that the pedagogical competence of teachers after implementing Module 1 has not yet been achieved, as the average pedagogical competence score of economics teachers is 35 out of a maximum score of 100.	The pedagogical competence of teachers after implementing Module 2 remains unmet, as the average pedagogical competence score of economics teachers is 68 out of a maximum score of 100.

The outcomes from the two cycles of module implementation indicated an improvement in the pedagogical competence of economics teachers; however, the expected targets were not fully achieved. In Cycle 1, the average pedagogical competence score reached only 35 out of a maximum of 100, suggesting that Module 1 did not have a significant impact. This limitation may be attributed to a lack of understanding of the module's content or the ineffectiveness of the methods employed.

In Cycle 2, following the implementation of Module 2, the pedagogical competence score increased to 68 out of 100. While this marks a notable improvement, the target competency level was still not fully attained. Further evaluation is necessary to enhance the less effective aspects of the module, such as teaching strategies and material relevance, to optimize teachers' pedagogical competence.

4.3. Extensive Product Testing

The third prototype of the PCL Module was extensively implemented with 50 economics teachers, in addition to those who had participated in the limited trials. The results from Cycle 3 showed that the third prototype successfully improved the pedagogical competence of economics teachers. The scores progressed from 35 in Cycle 1 to 68 in Cycle 2 and finally to 84 in Cycle 3. Consequently, the limited product testing conducted across three cycles successfully enhanced the pedagogical competence of the initial 20 economics teachers.

To evaluate the effectiveness of the third prototype of the PCL Module in this extensive trial, descriptive statistical analysis was performed using the N-gain calculation method based on Hake's theory (1999: 65). Data on the pedagogical competence of high school economics teachers in the 21st century were derived from a combination of results across all pedagogical competency aspects assessed before and after the implementation of the Pedagogical Content Learning Module. The pre-test and post-test data were analyzed to determine the mean, standard deviation, gain, and N-gain, as shown in Table 3.

The data in Table 3 indicates that overall, the pedagogical competence of high school economics teachers in the 21st century, taught using the Pedagogical Content Learning Module, shows an increase in post-test scores ($M = 70.21$; $SD = 6.79$), which is significantly higher than the pre-test scores ($M = 52.96$; $SD = 5.59$). This improvement positively impacts the N-Gain of teachers taught using the module, with an $N = 0.37$, categorized as moderate.

In addition to descriptive statistical analysis, the effectiveness test in this study was also conducted using a t-test, preceded by prerequisite tests, including normality, homogeneity, and covariance equality tests. The following are the results of the prerequisite tests:

Table 3. Pedagogical Competence of High School Economics Teachers In The 21st Century Era

	Aspect	Number of Data	Pre-test		Post-test		Gain	N-Gain	Interpretation
			Mean	SD	Mean	SD			
PCL Modul	Learning model	50	51.78	6.85	74.26	8.44	22.48	0.47	Medium
	Media and technology		49.95	5.45	66.57	6.09	16.62	0.33	Medium
	Learning assessment		54.14	5.19	70.08	6.47	15.94	0.35	Medium
	Lesson planning		54.78	5.28	70.08	6.47	15.30	0.34	Medium
	Economics teacher efficacy		54.14	5.19	70.08	6.47	15.94	0.35	Medium
	Total		52.96	5.59	70.21	6.79	17.26	0.37	Medium

4.3.1. Normality Test

The normality test was conducted to determine whether the data followed a normal distribution. The statistical test applied was the Kolmogorov-Smirnov method, which is similar to the Liliefors method. A significance level of $\alpha = 5\%$ was used. The criterion for conclusion states that if the significance value > 0.05 , the population data is normally distributed, and H_0 is not rejected. Based on computational results using SPSS 15, it was found that the overall test results indicated that the data was normally distributed (P-value > 0.05).

Table 4. Data Normality Test Results

Aspect	Model	Kolmogorov-Smirnov (a)			Interpretation
		Statistic	df	Sig.	
Learning model	PCL	0.053	50	0.200(*)	Normal
Media and technology	PCL	0.070	50	0.200(*)	Normal
Learning assessment	PCL	0.074	50	0.200(*)	Normal
Lesson planning	PCL	0.074	50	0.200(*)	Normal
Economics teacher efficacy	PCL	0.077	50	0.200(*)	Normal
Total	PCL	0.109	50	0.058	Normal

4.3.2. Homogeneity Test

The homogeneity test was conducted to determine whether a sample was drawn from a population with homogeneous variance. The statistical method used was Levene's Test of Variance. The significance level (α) applied in this study was 5%.

Table 5. Data Homogeneity Test Results

Aspect	Indicator	F	Sig.	Interpretation
Learning model	Cognitive	3.926	0.050	Homogenous
	Affective	1.581	0.211	Homogenous
	Psychomotor	2.402	0.124	Homogenous
Media and technology	Cognitive	3.889	0.051	Homogenous
	Affective	1.235	0.269	Homogenous
	Psychomotor	1.233	0.269	Homogenous
Learning assessment	Cognitive	4.889	0.059	Homogenous
	Affective	4.061	0.051	Homogenous
	Psychomotor	6.476	0.052	Homogenous
Lesson planning	Cognitive	3.070	0.065	Homogenous
	Affective	3.500	0.064	Homogenous
	Psychomotor	0.937	0.335	Homogenous
Economics teacher efficacy	Cognitive	0.058	0.810	Homogenous
	Affective	0.159	0.690	Homogenous
	Psychomotor	0.193	0.661	Homogenous

4.3.3. Covariance Equality Test

The covariance equality test was conducted to determine whether the data from all variables had equal covariances. The statistical method used for this purpose was Box's M Test. The significance level (α) used in this study was set at 5%. Based on the test results, it was determined that the data overall exhibited equal covariances among variables (P-value > 0.05).

Table 6. Covariate Similarity Test Results

Aspect	Box's M	F	Sig	Interpretation
Learning model	10.688	1.03	.412	There is a similarity of covariance between variables. The Learning model
Media and technology	8.745	1.42 0	.202	There is a covariance between variables of Media and technology
Learning assessment	22.385	1.01 3	.443	There is a covariance between variables. Learning assessment
Lesson planning	22.750	2.19 8	.055	There is a covariance similarity between variables. Learning planning
Economics teacher efficacy	22.171	2.14 2	.068	There is a similarity of covariance between variables of economics teacher efficacy

After fulfilling all prerequisite tests, a t-test was performed using SPSS software to compare the effects of different learning models on the achievement of students' higher-order thinking skills (HOTs). Specifically, the analysis involved comparing the mean gain scores between the Stim-HOT model and the DI model. The statistical test employed was the independent sample t-test. The decision criterion was that if the significance value was less than 0.05, there was a significant difference between the PCL module and the other learning models, leading to the rejection of H_0 . The statistical results indicated a significant difference in pretest-posttest pedagogical competence scores between teachers who used the PCL module (P-value = 0.000 < 0.05). Detailed results of the t-test analysis are presented in Table 7.

Table 7. HOTs t-test results

Gain	Mean	SD	F	Sig	T	Sig (2-tailed)	Interpretation
Stim-HOT	18.46	4.39	0.114	0.737	12.593	0.000	H_0 rejected

The following presents the results of the calculation of effect size from the acquisition of pretest and posttest scores that have been carried out in the study. Table 8 is the result of the effect size test.

Table 8. Effect Size Test

Data	Average	SD	effect size	Category
Posttest-pretest	3.3594	3.16913	1.06	High

Based on Table 7, the average Posttest-pretest value is 3.3594, and the standard deviation is 3.16913, then analyzed for the effect size test to obtain a value of 1.06 or more than 1 so that the effect size score is categorized as giving a large effect.

5. Discussion

The core of the learning process lies in the competency of teachers (Dotger, 2015; Erviana et al., 2021; Fauziyah et al., 2022; Wulandari & Hendriani, 2021). Improving teachers' pedagogical competence is of high urgency, as teachers play a pivotal role in determining the quality of education (Geletu, 2022; Hollenstein & Brühwiler, 2024; Santosa et al., 2022; Sutrisno et al., 2024). Teachers with strong pedagogical competence can design, manage, and evaluate the learning process effectively, directly impacting student learning outcomes (Moreira, Arcas, Sánchez, García, Melero,

et al., 2023). Pedagogical competence encompasses educators' abilities to understand students' characteristics and effectively design, implement, and evaluate learning by leveraging technology and professional reflection. It also involves efforts to enhance teaching quality through training and self-development (Berishvili et al., 2020; Marques & Rosado-Pinto, 2017; Suci & Mata, 2011; Wiyanarti et al., 2024).

Optimal pedagogical competence is reflected in teachers' systematic execution of their roles and functions in designing, implementing, and evaluating learning, thereby fostering quality education (Afandi et al., 2021; Faltis & Abedi, 2013). One factor influencing the enhancement of teachers' pedagogical competence is the use of instructional modules (Ani Hastuti et al., 2022; Maryani et al., 2017; Wiyanarti et al., 2024).

The PCL module, in the context of economics education at the high school level, holds significant potential for improving teachers' pedagogical competence, particularly in addressing 21st-century challenges. This era is marked by the complexity of educational demands, requiring teachers to not only master subject content but also possess robust pedagogical skills. The PCL module, designed to integrate pedagogical content with approaches adaptive to technological developments and 21st-century competencies, serves as an effective tool to assist teachers in achieving these objectives. Based on this concept, the hypothesis that the PCL module can enhance the pedagogical competence of high school economics teachers in the 21st century is well-founded.

Research by various scholars supports this hypothesis. For instance, a study by Ani Hastuti et al. (2022) demonstrated that pedagogical competence improvement based on instructional materials proved effective in significantly enhancing teachers' pedagogical competence. Additionally, Guillén-Gómez et al. (2021) found that the module enabled teachers not only to teach economics theoretically but also to connect the material with real-life contexts relevant to students. Other studies confirmed that training modules positively impacted teachers' skills in explanation (Findeisen et al., 2021; Findeisen & Seifried, 2023), critical thinking, and digital literacy (Kapasheva et al., 2024).

The statistical analysis using a t-test on pretest and post-test scores further confirmed a significant difference in the mean scores of teachers' pedagogical competence. These findings illustrate that teachers using the PCL module experienced greater improvements in their pedagogical competence scores compared to those who did not use the module. The lower pretest scores, compared to the posttest scores, indicate that teachers' pedagogical abilities were at a lower level before using the module. Following the training with the module, significant improvements occurred, highlighting the module's success in enhancing pedagogical competence.

The study also included an effect size analysis to measure the impact of the PCL module on teachers' pedagogical competence. The results revealed a large effect size, according to Cohen's criteria, indicating that the intervention through the module produced a substantial impact on improving teachers' competencies. This implies that the PCL module not only resulted in meaningful changes in test scores but also enhanced the practical teaching skills required for addressing the challenges of 21st-century education.

These findings reinforce the argument that the use of the PCL module is not only effective in improving high school economics teachers' pedagogical competence but also contributes to long-term improvements in educational quality. Teachers with high pedagogical competence are better equipped to adapt to contemporary developments, implement teaching methods suitable for students' characteristics, and manage classrooms more effectively.

6. Limitations

Teachers' competency is essential on the learning process of the education sector. In this study, development of the Pedagogical Content Learning (PCL) Module shows as an effective tool for

enhancing teachers' pedagogical competence. This module is not only providing a deeper understanding of teaching methods but also facilitating tangible changes in daily teaching practices. With a module tailored to the demands of 21st-century competencies, high school economics teachers are better prepared to face the increasingly complex challenges of the education sector.

7. Limitations

This study has certain limitations, such as the specific application of the PCL module to economics education in high schools, which restricts the generalizability of the findings to other subjects or educational levels

8. Suggestion

Further research is recommended to develop and test the PCL module in various subjects and education levels. This testing aims to assess the effectiveness of the module in a broader context as well as ensure that the methods applied can be accepted and adapted in various learning environments. Thus, the research results can be more generalized and significantly contribute to developing innovative and effective learning strategies.

Declarations

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