



STRENGTHENING THE PEDAGOGICAL COMPETENCE OF NON-EDUCATION LECTURERS THROUGH THREE STRATEGIC DIMENSIONS IN THE 21ST CENTURY LEARNING

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Abstract. Pedagogical competence plays a crucial role for lecturers in 21st-century learning. Strengthening the pedagogical competence of lecturers is essential for improving the quality of higher education, especially for those who do not come from an educational background. This study examines how three strategic dimensions—lecturer characteristics, lecturer involvement and contribution within the institution, and competence development strategies—shape the pedagogical competence of non-education lecturers in the context of 21st-century learning. Using a mixed-method approach, the study involved 20 non-education lecturers from four higher education institutions in Banyumas Regency. Data were collected through interviews and surveys and analyzed using Smart PLS. The results show that lecturer involvement and contribution, as well as competence development strategies, significantly and positively influence pedagogical competence. However, lecturer characteristics alone do not show a significant effect. These findings indicate that pedagogical competence is strengthened not only by personal attributes but also by active institutional engagement and structured development strategies supported by professional leadership. The study highlights the need for integrated and collaborative efforts to enhance teaching capacity among non-education lecturers. The results suggest that universities should prioritize institutional frameworks that encourage lecturer participation, provide continuous mentoring, and support strategic competence development programs. Strengthening these dimensions can lead to more effective teaching practices, foster humanistic learning environments, and ultimately improve student learning outcomes in the rapidly evolving landscape of higher education.

Keywords: Characteristics, Contribution, Competence Strategy, Pedagogical, Non Education Lecturers

1. Introduction

Learning in the 21st century requires both lecturers and students to think critically and creatively, to be innovative, communicative, and collaborative. They also need to have the ability to use information and communication technology (ICT) effectively. The quality of a lecturer's teaching skills greatly determines the success of education, as it directly influences the quality of the learning process and students' outcomes. Lecturers who come from non-education backgrounds often feel uncertain about their teaching performance in today's complex and dynamic learning environment. Yet, teaching and learning remain at the heart of education, serving as key processes that nurture students' growth, character, and meaningful interaction with their lecturers [1].

Teachers and lecturers form the foundation of many professions, standing at the forefront of a nation's development. The quality of their work has a direct impact on how far a country can advance [2]. Based on the Law of the Republic of Indonesia No. 14 of 2005 concerning Teachers and Lecturers, Article 10 paragraph 1, teachers and lecturers are required to possess



four core competencies namely pedagogical, personal, social, and professional. These four aspects are interconnected and together shape the professional identity of an lecturers. To deliver quality education, continuous improvement and adaptation to social and technological changes are essential. Therefore, enhancing teachers' competencies must be viewed as a continuous and reflective process. Among these four competencies, pedagogical competence refers to a teacher's deep understanding of students' characteristics and roles. It also involves the ability to design and implement meaningful learning experiences, understand students' cognitive development, plan and deliver lessons effectively, assess learning outcomes, and consistently seek ways to improve teaching practices.

Pedagogical competence functions as the fundamental benchmark of professional teaching standards, representing the essential base upon which educational practice is built. It embodies an lecturer's ability to creatively address pedagogical challenges by combining professional insight, experience, ethical values, and personal aptitude to achieve meaningful and effective learning outcomes [3]. In this respect, pedagogical competence stands as the core pillar of educational effectiveness [4].

Recent studies show that pedagogical competence in higher education now includes digital literacy, reflective practice, adaptive learning, and student-centered methods, not just teaching skills. Today, lecturers must keep up with technology and meet the needs of a diverse student body. However, most research examines pedagogical competence among lecturers with educational backgrounds or discusses it generally, without focusing on the unique challenges they face in other fields [5], [6]. Most studies also focus on just one aspect, like training or professional development. There is little research on how lecturer characteristics, institutional support, and development strategies together affect pedagogical competence in non-education lecturers [7].

Most previous research has used qualitative or descriptive methods, so there is little empirical evidence on how these factors are connected. This study aims to fill that gap by developing a model to examine how lecturer characteristics, institutional involvement, and development strategies interact to improve pedagogical competence among non-education lecturers. Using a mixed-methods approach and Smart PLS analysis, this research contributes to the conversation on humanistic and collaborative learning in higher education by demonstrating the importance of institutional support and sustainable development strategies [8], [9].

A major issue affecting lecturer performance in many higher education institutions is the limited level of pedagogical competence [10]. This competence must continuously evolve to keep pace with the transformations of the 21st century, particularly as education becomes increasingly digitalized. Teaching and learning are now shaped by e-learning, m-learning, and u-learning, which reflect the deep integration of digital platforms in academic settings [11]. These innovations aim to prepare universities to produce competent and competitive graduates who meet both national and international quality standards. Students today are expected to develop not only technical skills but also interpersonal skills that equip them to succeed in diverse job markets at local, national, and global levels [12].

Given this context, a strategic framework is urgently needed to design an effective pedagogical competence model for lecturers from non-education backgrounds. Strengthening this competence is crucial for enhancing teaching performance and ensuring the delivery of quality education [13]. Despite institutional efforts to improve teaching practices, many universities still encounter learning challenges rooted in insufficient pedagogical skills. The non-educational background of many lecturers further raises concerns about their teaching effectiveness in today's demanding educational environment. The core issue underlying educators' professional competence remains the low level of pedagogical mastery. Therefore, developing an effective pedagogical competence model should begin with approaches that



respond directly to learners' authentic needs. Enhancing pedagogical competence must stem from the educator's internal values, reflecting a deep sense of professional purpose and spiritual integrity [14].

Efforts to improve and develop pedagogical competence have also been carried out by non-education lecturers through various means, such as independent learning, collaboration with colleagues, and participation in development programs facilitated by the institutions where they teach [15]. The initial step in developing a pedagogical competence model can begin with the lecturers themselves, for instance by recognizing their personal profiles, teaching experiences, and individual potentials [16]. Furthermore, the contribution and engagement of lecturers within the university are equally important, as reflected in their understanding of the institution's vision and mission, as well as their commitment to fulfilling their roles and responsibilities in achieving the institution's goals. The alignment between individual and organizational values fosters professionalism that enhances both personal and institutional capacity [17].

Lecturer characteristics represent the fundamental abilities that lecturers must possess in order to develop themselves optimally and effectively within their profession [25]. Developing a competence model involves creating a supportive work environment by integrating the roles and participation of individuals as essential human resources [26]. An individual's engagement within an organization is reflected through their understanding and mastery of the institution's vision and mission, their assigned responsibilities, and the contribution they make to the organization's overall performance [27]. Such involvement plays a significant role in competency-based development models [28]. Competency development strategies should be grounded in constructive principles and the concept of learning by doing, which in this context refers to competency-focused strategies [29]. A lecturer's ability to design and implement such strategies can be observed through their capacity for innovation, which serves as an indicator of successful learning outcomes [30].

In addition, strategies for developing pedagogical competence require professional leadership—leaders who can design initiatives to enhance teaching knowledge and provide continuous mentoring. To establish such leadership, development strategies should include reflective abilities, pedagogical knowledge, and effective communication skills [17]. The model for developing pedagogical competence profiles should also emphasize the lecturers' ability to provide students with opportunities for active participation, assist them in understanding and overcoming learning barriers, and encourage their personal growth. This process requires self-leadership as a foundation for lecturers to build an educator's character who understands students' needs and challenges, aiming to create a humanistic learning environment that produces competent and high-quality graduates [18].

2. Methods

This study employed qualitative and quantitative research designs with data collection techniques that included interviews and surveys. The researcher acted as both the key instrument and the primary data collector. As the main instrument, the researcher determined the key informants who could provide relevant insights aligned with the study's objectives. The research sample consisted of 20 non-education lecturers from four higher education institutions, both public and private, located in Banyumas Regency. Data were processed using Smart PLS software.

The data analysis procedure began with instrument testing, including validity and reliability assessments, followed by data transformation using the Method of Successive Intervals (MSI) and classical assumption testing. Subsequently, Smart PLS was utilized to analyze and identify the relationships among the strategic dimensions of pedagogical competence.

In general, data collection techniques in qualitative research can be divided into interactive methods such as interviews and observations and non-interactive methods like documentation. In this study, data were gathered through in-depth interviews, observations, and document analysis. The survey component employed a closed-ended Likert-scale questionnaire as the primary data collection instrument. The questionnaire items consisted of both positive and negative statements, which were developed based on indicators from the three strategic dimensions of pedagogical competence: lecturer characteristics, lecturer involvement and contribution within the university, and strategies for developing pedagogical competence.

The development of a pedagogical competence model can begin with individual lecturers by identifying their personal profiles, teaching experiences, and potential. The next dimension focuses on lecturers' involvement and contribution to their institutions, reflected in their understanding of the university's vision and mission, as well as their commitment to fulfilling their roles and responsibilities to achieve these goals. The alignment between individual and organizational values fosters professional integrity, enhancing both personal and institutional capacity [16]. Furthermore, effective strategies for developing pedagogical competence require professional leadership—leaders who can design and implement initiatives that enhance teaching knowledge and provide consistent mentoring. To cultivate such leadership, development strategies should include reflective skills, pedagogical expertise, and effective communication abilities [17].

The model for developing pedagogical competence profiles also emphasizes lecturers' abilities to create opportunities for active student participation, support students in understanding and overcoming learning barriers, and nurture their potential. This effort involves self-leadership as a foundational element for fostering an educational approach that highlights lecturers' understanding of students' needs and challenges, with the ultimate goal of nurturing humanistic and high-quality graduates [18], [19].

3. Results And Discussion

a. Data Analysis

This study utilized Smart PLS version 3.0, a software specifically designed for estimating variance-based structural models. The research framework was illustrated using a path diagram that depicts the relationships within both the outer model and the inner model, as shown in Figure 1. This diagram visualizes the interactions between observed variables and latent constructs.

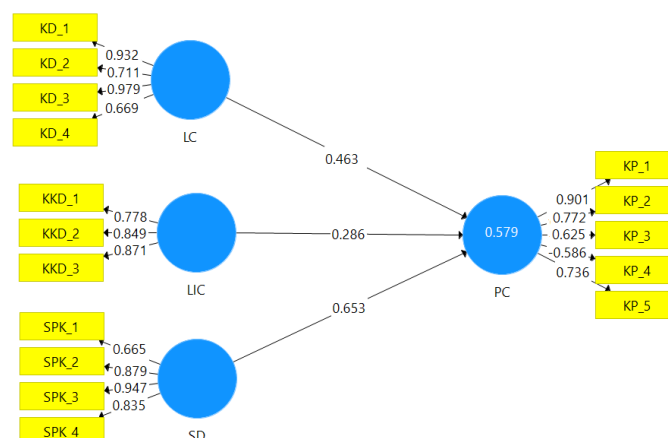


Figure 1. Outer and Inner Model
(Data processed by the researcher using Smart PLS 3, 2025)

Table 1. Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
LC	0.715	1.013	0.791	0.587
LIC	0.780	0.783	0.872	0.695
PC	0.841	0.745	0.896	0.768
SD	0.761	0.876	0.845	0.609

Source: Data processed using Smart PLS, 2025

b. Convergent Validity

A variable can be considered to have good validity toward its latent construct when, according to Hair et al. as cited by Sihombing and Arsani (35), an indicator demonstrates strong convergent validity in Smart PLS analysis if its factor loading value exceeds 0.6 and the Average Variance Extracted (AVE) value is greater than 0.5. The analysis of the outer loading table from the figure above indicates that all variable indicators possess valid loading values, each scoring above the 0.6 threshold.

c. Discriminant Validity

Based on Table 1, the Cronbach's Alpha values for all constructs are above 0.70, and the composite reliability values also exceed 0.70. Meanwhile, the Average Variance Extracted (AVE) for each construct is greater than 0.50. These results indicate that all constructs meet the reliability criteria and can be considered dependable.

d. R-Square (R^2)

Table 2. R Square

	R Square	R Square Adjusted
PC	0.579	0.500

Source: Data processed using Smart PLS, 2025

The R-Square value is used to determine the extent to which the independent latent variables affect the dependent variable. The adjusted R-Square value for the pedagogical competence variable is 0.579, indicating that the competence development strategy contributes 57.9% to the variation in pedagogical competence, while the remaining 42.1% is influenced by factors outside the model. The adjusted R-Square value for the competence development strategy variable is 0.552, meaning that lecturer characteristics and lecturer involvement and contribution collectively influence 55.2% of the variation in competence development strategy, with the remaining 44.8% explained by variables outside the model. The R^2 values fall within the moderate to strong category, suggesting that the model demonstrates a good level of explanatory power.

e. Effect Size (F-Square)

The F-Square value is used to assess the extent to which a predictor variable (X) affects the dependent variable (Y). The F-Square results can be interpreted in terms of effect strength: a score between 0.02 and <0.15 indicates a small effect, a score between 0.15 and <0.35 represents a medium effect, while a value of 0.35 or higher signifies a strong effect of the predictor variable on the dependent variable.

Table 3. F Square

	LC	LIC	PC	SD
LC			0.069	
LIC			0.133	
PC				
SD			0.651	

Source: Data processed using Smart PLS, 2025

Based on the study's findings, the F-square value for the Lecturer Characteristics variable (0.069) indicated a weak influence on the Pedagogical Competence, while the Lecturer Involvement and Contribution variable (0.133) showed a medium effect on the. Meanwhile, the Strategy Development itself (0.651) demonstrated a strong impact on Pedagogical Competence.

f. Hypothesis Testing (t-test)

Hypothesis testing is a method used to evaluate the significance of relationships between variables, taking into account the path coefficient or inner model. In this study, the level of significance was assessed by comparing the t-statistic value with the t-table value, using a significance level (α) of 0.05, which corresponds to a 95% confidence level. A hypothesis is considered supported if the t-statistic exceeds the t-table value (≥ 1.96 for a two-tailed test). This testing plays a crucial role as it either strengthens or rejects the research assumptions, providing clarity on the relationships between the variables under investigation.

Table 4. Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
LC -> PC	0.463	0.138	0.481	0.411	0.411
LIC -> PC	0.286	0.031	0.402	1.980	0.047
SD -> PC	0.653	0.476	0.501	2.303	0.023

Source: Data processed using Smart PLS, 2025

The data analyzed using Smart PLS 3 were further tested through simulations for each hypothesized relationship. In this study, the bootstrapping technique was applied to the research sample. The use of bootstrapping aimed to minimize potential issues arising from non-normal data distribution. The results of the analysis using Smart PLS with the bootstrapping approach are presented as follows:

1) Lecturer Characteristics on Pedagogical Competence

In Table 4, the t-statistic value is $1.980 > 1.96$, with a significance level (p-value) of $0.411 > 0.05$. Therefore, H_0 is accepted and H_2 is rejected, indicating that Lecturer Characteristics do not have a significant effect on Pedagogical Competence. Changes in Lecturer Characteristics do not influence Pedagogical Competence. The hypothesis is rejected.

2) Lecturer Involvement and Contribution on Pedagogical Competence

In Table 4, the t-statistic value is $1.187 < 1.96$, with a significance level (p-value) of $0.047 < 0.05$. Thus, H_0 is rejected and H_3 is accepted, meaning that Lecturer Involvement and Contribution has a positive and significant effect on Pedagogical Competence. The higher the



Lecturer Involvement and Contribution the greater the Pedagogical Competence, and vice versa. The hypothesis is accepted.

3) Competence Development Strategy on Pedagogical Competence

In Table 4, the t-statistic value is $2.303 > 1.96$, with a significance level (p-value) of $0.023 < 0.05$. Hence, H_0 is rejected and H_3 is accepted, indicating that Competence Development Strategy has a positive and significant effect on Pedagogical Competence. The higher the Competence Development Strategy, the greater the Pedagogical Competence, and vice versa. The hypothesis is accepted.

Human Resource Competence refers to a person's abilities and characteristics—such as knowledge, skills, and behavioral attitudes—that are required to carry out their job responsibilities within a professional environment [20]. This definition highlights that competence is fundamentally tied to the individual's personal attributes. The role of higher education institutions in preparing qualified and reliable human resources is inseparable from the performance of their lecturers [21]. Lecturer involvement in professional organizations also plays a meaningful role in enhancing student competence through various mechanisms, including integrating professional experience into teaching, supporting internship opportunities, and strengthening understanding of professional ethics [22].

High-quality universities require lecturers who perform effectively to meet the demands of the Tri Dharma Perguruan Tinggi: education, research, and community service [23]. Lecturers who pursue advanced studies, engage in continuous professional training, and collaborate with colleagues in using information technology contribute significantly to building learning processes that are more interactive and dynamic [30]. When lecturers participate and contribute optimally to the Tri Dharma, higher education institutions are better positioned to support national development. Improving the quality of human resources, especially lecturers, can be achieved through competency development initiatives supported by the institution [31].

Efforts to strengthen lecturer professionalism are carried out through formal pathways such as workshops, certified training programs, advanced studies, and internship practices in industry settings [32]. These strategies are designed to enhance both pedagogical and professional competencies, including the use of learning technologies, curriculum design, facilitation of scientific publications, and the development of international academic networks [33]. The effectiveness of these initiatives depends greatly on institutional commitment, the availability of funding resources, lecturer motivation, and the presence of a consistent and ongoing evaluation system [34].

The findings of this study reinforce previous arguments stating that pedagogical competence development among higher education lecturers is strongly influenced by institutional ecosystems that support continuous professional learning. Sustainable mentoring systems, collaborative academic culture, and institutional support for reflective teaching practices significantly contribute to lecturers' instructional effectiveness and adaptability in digital learning environments [36]. In addition, this study extends prior research by demonstrating that pedagogical competence among non-education lecturers cannot rely solely on individual characteristics but requires structured institutional interventions and ongoing competence development strategies. This finding highlights a critical gap in the literature, which has often overlooked the collective role of institutional participation and strategic development programs in shaping pedagogical competence [37].

The novelty of this study also lies in its focus on non-education lecturers, a group that has received relatively limited scholarly attention despite playing a significant role in higher education systems. By integrating strategies for lecturer involvement, contribution, and competence development into a single analytical framework, this research offers a more comprehensive perspective on how universities can strengthen lecturer professionalism and



improve the quality of 21st-century learning environments. These findings support the view that higher education institutions should move beyond conventional training models toward collaborative, reflective professional development systems responsive to contemporary educational challenges [38], [39].

4. Conclusion

This study highlights the essential role of pedagogical competence in supporting the effectiveness of non-education lecturers in 21st-century learning environments. By examining three strategic dimensions—lecturer characteristics, lecturer involvement and contribution, and competence development strategies—the research provides a clearer understanding of the factors that shape teaching quality in higher education.

The findings show that lecturer involvement and contribution, as well as competence development strategies, have a significant and positive influence on pedagogical competence. These results suggest that when lecturers actively engage with institutional goals and participate in meaningful academic roles, their ability to teach effectively improves. Furthermore, competence development strategies—particularly those supported by reflective practice, strong pedagogical knowledge, and effective mentoring—play a critical part in strengthening teaching skills. Conversely, lecturer characteristics alone do not significantly affect pedagogical competence, indicating that personal attributes must be supported by structured development efforts and institutional engagement to yield meaningful improvements.

Overall, this study emphasizes that enhancing pedagogical competence requires a collaborative and integrated approach. Individual effort, institutional support, and strategic leadership must work hand in hand to help non-education lecturers meet the demands of modern learning. Strengthening these dimensions will not only improve teaching performance but also contribute to creating a more humanistic, supportive, and high-quality learning environment for students.

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