Enhancing Pedagogical Competence of Pre-Service Islamic Education Teachers through Peer Assessment and Constructive Feedback

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ABSTRACT

Purpose – This study aims to analyze the influence of peer assessment and constructive feedback on the pedagogical skills of Islamic Education pre-service teachers in the microteaching course.

Design/methods/approach – This research employed a quantitative design with a correlational explanatory approach. The study population consisted of two classes of sixth-semester students from the Islamic Education Study Program at the State Institute for Islamic Studies (IAIN) Curup, all of whom were enrolled in the microteaching course. The data were analyzed using multiple linear regression to assess both the simultaneous and partial effects of the two independent variables on the dependent variable.

Findings – The F-test showed a value of 24.173 with a significance of 0.000 ($p < 0.05$), indicating that peer assessment and constructive feedback together significantly affect students' pedagogical skills. The t-test results revealed that peer assessment ($t = 3.052$, $p = 0.004$) and constructive feedback ($t = 3.762$, $p = 0.000$) each have a significant individual impact ($p < 0.05$), confirming their respective contributions to improving pedagogical skills.

Research implications – Pedagogical skills are essential for prospective teachers, especially in improving their understanding and teaching skills. Although microteaching offers practical teaching experience, students still face challenges in areas such as lesson planning, classroom management, teaching strategies, and assessment. To address these issues, peer assessment and constructive feedback offer promising strategies to enhance pedagogical development.

1. Introduction

The transformation of 21st-century education demands a paradigm shift in the learning process, especially in teacher education, where prospective teachers are required to possess pedagogical competencies as a foundation before embarking on their teaching careers. Pedagogical competency is a fundamental pillar in shaping the quality of future educators, enabling them to navigate the increasingly complex dynamics of teaching and learning (Syahrial et al., 2019). This competency includes various essential abilities for effective teaching, such as understanding students, designing and implementing learning activities, evaluating learning outcomes, and fostering student development (Hakim & Firmansyah, 2024). InTASC (Interstate New Teacher Assessment and Support Consortium) defines pedagogic skills as the competencies a teacher must possess to facilitate student learning effectively, which includes recognizing individual student needs, employing adaptive teaching strategies, and utilizing technology to enhance educational outcomes (Setiawan et al., 2025; Tomory, 2023).

However, various studies indicate significant weaknesses in prospective teachers' mastery of pedagogical skills. Skills such as lesson planning, lesson implementation, and the ability to build relationships with students are often considered lacking (Torff & Sessions, 2005). Weaknesses are also observed in effective teaching skills, such as instructional strategies and classroom management (Welsh & Schaffer, 2017). Additionally, prospective teachers' digital literacy is often insufficient, hindering their ability to integrate technology effectively into the teaching curriculum (Alonso-García et al., 2024). These findings suggest a significant gap in the teacher education system, particularly in strengthening pedagogical aspects through meaningful learning experiences.

One strategic course in shaping pedagogical skills is microteaching. Microteaching helps prospective teachers hone various basic teaching skills, such as lesson planning, classroom management, and delivering instructions (Mishra, 2024). It allows prospective teachers to practice and refine their teaching skills in simulated scenarios before facing real classrooms (Luo & Li, 2024). Through microteaching, prospective teachers can enhance their self-confidence and self-efficacy in managing classrooms and applying effective teaching techniques (Mukuka & Alex, 2024). Unfortunately, in practice, the approach used in microteaching often remains one-sided, with the lecturer being the sole evaluator and students merely passive implementers of the instructions given. The lack of active student involvement in providing and receiving constructive feedback results in a limited reflective process. This leads to a low capacity among students to continuously improve the quality of their teaching.

Amid the need for collaborative and reflective learning, the peer assessment approach is gaining attention as a promising alternative. Peer assessment is a process in which students evaluate the work of their peers based on specific criteria that have been agreed upon (Mumpuni et al., 2022). This process not only allows students to gain new perspectives on their teaching practices but also enhances their sense of responsibility, engagement, and metacognitive abilities. Peer assessment has been shown to enhance students' evaluative skills and reflective abilities when implemented in a structured and consistent manner (Topping, 2009). However, some students still doubt the objectivity and validity of peer assessments. They tend to believe that only lecturers have the authority to provide valid assessments. This condition highlights the need to strengthen evaluative literacy and an academic culture that supports peer-based learning.

Peer assessment and constructive feedback in micro-teaching can provide significant benefits in the development of pedagogical skills for prospective teachers. Although peer assessment has been implemented in various contexts, many implementations are still limited to providing general and poorly structured feedback. This often results in minimal progress in improving teaching quality, even though peer assessment is recognised to develop critical skills such as self-assessment, critical analysis, and reflection (Brkić et al., 2024). However, previous studies have shown that if peer assessment is conducted with a more systematic and directed approach, it can serve as a more effective tool in helping prospective teachers develop evaluation and constructive feedback skills, as well as preparing them for future professional roles (Alcalá & Pueyo, 2016; Topping, 2009).

Similarly, despite the implementation of constructive criticism, numerous practices continue to lack explicit guidance for enhancement. The feedback given is frequently overly generic and lacks attention on specific areas for enhancement, thereby failing to promote students' meaningful reflection on their teaching methodologies. Conversely, more structured, affirmative, and comprehensive feedback can be more efficacious in improving students' self-regulation abilities and expediting their learning (Toit, 2012). Consequently, there exists significant potential to enhance the quality of micro-teaching by implementing more structured and growth mindset-oriented evaluation procedures, which can facilitate the more thorough and sustained advancement of pedagogical skills.

In the professional development of prospective teachers, constructive feedback plays an essential role in both their professional and personal growth by helping them analyze the strengths and weaknesses of their performance and identify necessary improvements (Prastiyani et al., 2020). Furthermore, constructive feedback can create a positive learning environment, which, in turn, affects students' feelings at school and their interest in learning (Phusavat et al., 2025). When a positive learning environment is fostered through constructive feedback, the effects also include a reduction in incidents of physical, verbal, and psychological bullying (Rassameethes et al., 2023).

The use of peer assessment and constructive criticism can synergistically enhance educational skills, since both promote profound reflection and elevate teaching quality (Tzeng et al., 2021). Within the framework of constructivist learning, social interaction facilitated by peer assessment enables students to collaboratively develop their knowledge through debates and evaluations (Anderson et al., 2020; Elizondo-Garcia et al., 2019). This aligns with social cognition theory, which underscores the significance of role models and observation in the learning process. Moreover, Vygotsky's notion of the Zone of Proximal Development (ZPD) is pertinent, as peer assessment enables pupils to surpass their own skills with the assistance of more knowledgeable peers (Lambright, 2024). The incorporation of this theoretical framework enhances comprehension of how collaboration in peer assessment and constructive feedback expedites the advancement of students' instructional skills. In the realm of global education, it is essential to clarify the implications associated with alignment to the global teacher competency framework, to guarantee that this research can significantly enhance the quality of teacher training and development globally.

Although studies on peer assessment and constructive feedback have been extensively conducted separately, few have examined the simultaneous effects of both variables on students' pedagogical skills, particularly in the context of the microteaching course. This represents a significant gap that needs to be addressed, as the integration of peer assessment and constructive feedback can create a richer and more reflective learning ecosystem. As stated in previous studies, learning processes that involve students in self-assessment and providing specific feedback can maximize learning benefits (Saralar-Aras & Güneş, 2024; Toit, 2012; Yan & He, 2017). However, the practical implementation of this concept remains limited within the context of microteaching in Indonesia.

Prospective Islamic Education (PAI) teachers face both unique challenges and opportunities. As students and future educators, PAI prospective teachers are required not only to master the subject matter but also to communicate religious values pedagogically (Amrullah et al., 2022). Pedagogical skills, in this context, include the ability to design Lesson Plans (RPP), manage classrooms, apply relevant methods, and evaluate learning outcomes objectively. Therefore, developing these skills requires a teaching model that goes beyond mere knowledge transfer (Muhamad et al., 2024). A strategy is needed that activates students as reflective and collaborative learners.

The objective of this research is to investigate the impact of constructive feedback and peer assessment on the pedagogical abilities of PAI students in the microteaching course. This study will specifically examine the premise that the incorporation of peer assessment and constructive feedback affects students' pedagogical skills in enhancing their teaching practices. This study hopes to improve how we understand reflective learning models by explaining different ways these models can be used, such as collaborative and constructivist reflection models in higher education. This study seeks to offer pragmatic guidelines for educators in formulating successful evaluation and feedback methodologies in microteaching. This project will enhance the dialogue on learning innovation in higher education, concentrating on the cultivation of pedagogical abilities for future educators through participatory and feedback-oriented methodologies. Consequently, the learning process fulfills curriculum requirements while significantly contributing to the development of prospective teachers' professionalism through enhanced reflection and assessment.

2. **Methods**

This study employs a quantitative approach, specifically using a structured method to collect data, ensuring consistency and reliability in research findings (Alford & Teater, 2025). This approach was chosen because the collected data is numerical, enabling statistical analysis to identify patterns, correlations, and potential causal relationships (Velec & Huang, 2014). The research design is explanatory correlational, which aims to identify and explain the relationships between variables. This design does not establish cause-and-effect relationships but can highlight significant connections that require further investigation (Fitzgerald et al., 2004). Based on data analysis, quantitative research is an approach that emphasises the objective testing of theories by collecting numerical data and analysing it using statistical procedures (Creswell, 2009).

The primary goal of this research is to explain the causal relationship between two independent variables, namely peer assessment and constructive feedback, and one dependent variable, the pedagogical skills of students. The explanatory correlational approach allows the researcher not only to identify relationships between variables but also to examine the extent to which the two independent variables simultaneously and partially affect the students' pedagogical skills within the context of the microteaching course. This design is relevant because it provides deeper insights into the contribution of each independent variable to the improvement of pedagogical competencies in prospective Islamic Education (PAI) teachers.
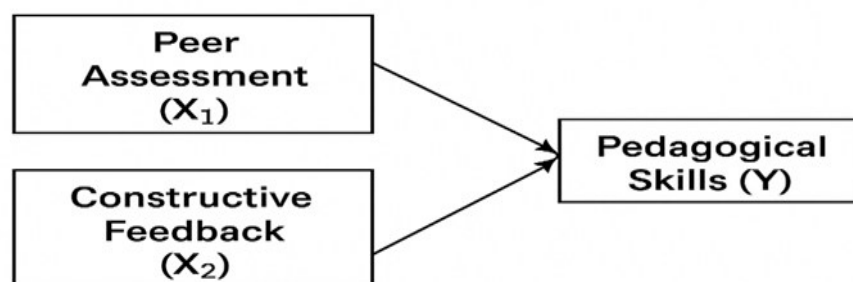
Figure 1. Explanatory Correlational Research Design

The subjects in this study are students of the Islamic Education Department at the State Islamic Institute (IAIN) Curup who are currently enrolled in the microteaching course. The research sample consists of 50 students from two classes, 6C and 6D, selected using a total sampling technique. This technique was chosen because the entire population shares characteristics relevant to the research focus, specifically being engaged in teaching practice through the microteaching course. As a result, this sampling method provides representative and valid data that meets the analytical needs of the study.

Table 1. Research population and sample

Class	Number of Students
6C	24
6D	26
Total research sample	50

Data collection was carried out using a closed-ended questionnaire with a Likert scale. The instrument was developed based on theoretical indicators for each research variable. For the peer assessment variable, the indicators included engagement in the assessment process, understanding of assessment criteria, and objectivity in evaluation. The constructive feedback variable was measured based on the reception, clarity/quality, and actionability of feedback provided by peers. Meanwhile,

pedagogical skills were assessed based on students' ability to develop instructional materials, conduct teaching sessions, communicate effectively during instruction, and perform reflection and evaluation during teaching practice. Questions or statements are arranged in the instrument according to the number of indicators from each variable (Creswell, 2009). Four questions are derived from each indicator based on the variables associated with that indicator.

Table 2. Data collection on variable indicators

Variable	Indicator	Number of Statement Items	Measurement Scale
Peer Assessment (X1)	1. Involvement in peer assessment	4	Likert scale 1–5
	2. Understanding of assessment criteria	4	Likert scale 1–5
	3. Objectivity of assessment	4	Likert scale 1–5
Constructive Feedback (X2)	1. Acceptance of feedback	4	Likert scale 1–5
	2. Quality of feedback received	4	Likert scale 1–5
	3. Action after receiving feedback	4	Likert scale 1–5
Pedagogical Skills (Y)	1. Learning planning	4	Likert scale 1–5
	2. Implementation of learning	4	Likert scale 1–5
	3. Learning communication	4	Likert scale 1–5
	4. Reflection and evaluation of learning	4	Likert scale 1–5

To ensure the validity and reliability of the instrument, the questionnaire was first piloted with a number of students who were not part of the research sample. Item validity was analyzed using the Pearson Product Moment correlation, while reliability testing was conducted by calculating the Cronbach's Alpha coefficient. An item was considered valid if the correlation value exceeded the critical r-value at a 5% significance level, and reliable if the alpha coefficient was ≥ 0.7 (Limberg et al., 2021).

Table 3. Validity Test Results

No	Peer Assessment			Constructive Feedback			Pedagogic Skills		
	R table	Pearson Correlation	Criteria	R table	Pearson Correlation	Criteria	R table	Pearson Correlation	Criteria
1	0.393	0.871	Valid	0.393	0.400	Valid	0.393	0.776	Valid
2	0.393	0.424	Valid	0.393	0.640	Valid	0.393	0.594	Valid
3	0.393	0.439	Valid	0.393	0.809	Valid	0.393	0.708	Valid
4	0.393	0.426	Valid	0.393	0.705	Valid	0.393	0.829	Valid
5	0.393	0.611	Valid	0.393	0.558	Valid	0.393	0.848	Valid
6	0.393	0.741	Valid	0.393	0.644	Valid	0.393	0.842	Valid
7	0.393	0.530	Valid	0.393	0.724	Valid	0.393	0.604	Valid
8	0.393	0.445	Valid	0.393	0.701	Valid	0.393	0.727	Valid
9	0.393	0.532	Valid	0.393	0.478	Valid	0.393	0.702	Valid
10	0.393	0.410	Valid	0.393	0.815	Valid	0.393	0.675	Valid
11	0.393	0.649	Valid	0.393	0.726	Valid	0.393	0.400	Valid
12	0.393	0,577	Valid	0.393	0.776	Valid	0.393	0.640	Valid
13	0.393	0.708	Valid	0.393	0.594	Valid	0.393	0.809	Valid
14	0.393	0.829	Valid	0.393	0.708	Valid	0.393	0.705	Valid
15	0.393	0.848	Valid	0.393	0.829	Valid	0.393	0.871	Valid
16	0.393	0.842	Valid	0.393	0.848	Valid	0.393	0.424	Valid
17	0.393	0.604	Valid	0.393	0.842	Valid	0.393	0.439	Valid

18	0.393	0.727	Valid	0.393	0.604	Valid	0.393	0.426	Valid
19	0.393	0.702	Valid	0.393	0.727	Valid	0.393	0.611	Valid
20	0.393	0.675	Valid	0.393	0.702	Valid	0.393	0.741	Valid
21	0.393	0.400	Valid	0.393	0.675	Valid	0.393	0.530	Valid
22	0.393	0.640	Valid	0.393	0.400	Valid	0.393	0.445	Valid
23	0.393	0.809	Valid	0.393	0.640	Valid	0.393	0.532	Valid
24	0.393	0.705	Valid	0.393	0.809	Valid	0.393	0.410	Valid
25	0.393	0.558	Valid	0.393	0.705	Valid	0.393	0.649	Valid
26	0.393	0.644	Valid	0.393	0.530	Valid	0.393	0,577	Valid
27	0.393	0.724	Valid	0.393	0.445	Valid	0.393	0.708	Valid
28	0.393	0.701	Valid	0.393	0.532	Valid	0.393	0.570	Valid
29	0.393	0.478	Valid	0.393	0.410	Valid	0.393	0.670	Valid
30	0.393	0.815	Valid	0.393	0.649	Valid	0.393	0.516	Valid
31	0.393	0.726	Valid	0.393	0,577	Valid	0.393	0.461	Valid
32	0.393	0.663	Valid	0.393	0.708	Valid	0.393	0.537	Valid
33	0.393	0.698	Valid	0.393	0.829	Valid	0.393	0.576	Valid
34	0.393	0.797	Valid	0.393	0.848	Valid	0.393	0.641	Valid
35	0.393	0.717	Valid	0.393	0.842	Valid	0.393	0.625	Valid
36	0.393	0.704	Valid	0.393	0.604	Valid	0.393	0.748	Valid
37	0.393	0.825	Valid	0.393	0.727	Valid	0.393	0.732	Valid
38	0.393	0.607	Valid	0.393	0.702	Valid	0.393	0.735	Valid
39	0.393	0.727	Valid	0.393	0.675	Valid	0.393	0.724	Valid
40	0.393	0.727	Valid	0.393	0.400	Valid	0.393	0.747	Valid
41	0.393	0.527	Valid	0.393	0.640	Valid	0.393	0.499	Valid
42	0.393	0.776	Valid	0.393	0.809	Valid	0.393	0.701	Valid
43	0.393	0.594	Valid	0.393	0.705	Valid	0.393	0.459	Valid
44	0.393	0.675	Valid	0.393	0.439	Valid	0.393	0.519	Valid
45	0.393	0.400	Valid	0.393	0.411	Valid	0.393	0.558	Valid
46	0.393	0.640	Valid	0.393	0.532	Valid	0.393	0.416	Valid
47	0.393	0.809	Valid	0.393	0.641	Valid	0.393	0.516	Valid
48	0.393	0.705	Valid	0.393	0.625	Valid	0.393	0.461	Valid
49	0.393	0.439	Valid	0.393	0.748	Valid	0.393	0.437	Valid
50	0.393	0.576	Valid	0.393	0.725	Valid	0.393	0.576	Valid

The results of the validity and reliability tests of the instrument show that all items are valid. The Pearson correlation values for each item range from r = 0.400 to 0.871, with a significance level of $p < 0.05$, which meets the validity criteria for 50 respondents. Additionally, the Cronbach's Alpha coefficient for this instrument is 0.81, indicating that the instrument has good reliability. This study uses the item validity method, which is Pearson Product Moment, where the interval data and distributed samples have been declared normal.

The collected data were analyzed using multiple linear regression with the assistance of statistical software (SPSS version 29). This analysis aimed to measure both the simultaneous and partial contributions of peer assessment and constructive feedback to students' pedagogical skills. The results of the analysis are presented in tables and graphs to facilitate interpretation and are interpreted based on statistical significance and the strength of the relationships among variables (Sullivan, 2024). With

this systematic and structured methodological approach, the study is expected to make a meaningful contribution to the development of more reflective, participatory, and effective microteaching strategies in fostering pedagogical competencies among prospective Islamic education teachers.

3. Results

This study aims to analyze the influence of peer assessment and constructive feedback on students' pedagogical skills in the microteaching course. The research sample consisted of 50 students from two classes in the Islamic Education (PAI) study program, selected using total sampling. Data were collected using a closed-ended questionnaire based on a five-point Likert scale, which had undergone validity and reliability testing prior to distribution.

3.1. Descriptive Statistics of Research Variables

The results of the descriptive analysis indicate that the peer assessment variable has a mean score of 75.4 with a standard deviation of 7.42. This value suggests that, in general, students hold a positive perception of their experience in receiving and providing peer assessments. Respondents reported that their involvement in the peer assessment process positively influenced their understanding of teaching quality standards and motivated them to improve their performance.

Table 4. Descriptive Statistical Test Results for Peer Assessment Variables

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Peer Assassement	50	26	62	88	3769	75.38	1.051	7.428	55.179	.023	.337	-1.065	.662
Valid N (listwise)	50												

For the constructive feedback variable, the analysis revealed a mean score of 72.74 with a standard deviation of 7.15. This indicates that students generally perceived the constructive feedback received during the microteaching course as supportive, clear, and confidence-enhancing. Such feedback was considered constructive in nature, contributing positively to their emotional reassurance and reinforcing their self-confidence as prospective educators.

Table 5. Descriptive Statistical Results of the Constructive Feedback Variable

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Feedback Construct	50	25	60	85	3637	72.74	1.011	7.151	51.135	.038	.337	-1.124	.662
Valid N (listwise)	50												

Meanwhile, the pedagogical skills variable had a mean score of 78.36 with a standard deviation of 7.75. This indicates that students generally perceive their pedagogical competence to be at a good level. This includes their ability to design lesson plans, manage classrooms, select appropriate teaching methods, evaluate learning outcomes, and demonstrate confidence during teaching practice.

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Pedagogic Skills	50	27	64	91	3918	78.36	1.096	7.753	60.113	-.106	.337	-1.074	.662
Valid N (listwise)	50												

Table 6. Descriptive statistical test results for pedagogical skills variables

3.2. Classical Assumption Testing

Prior to conducting multiple regression analysis, the researcher performed a series of classical assumption tests, including tests for normality, multicollinearity, and heteroscedasticity. The normality test, using the Kolmogorov-Smirnov method, produced an Asymp. Sig. (2-tailed) value of 0.077, which exceeds the threshold of 0.05. This indicates that the data are normally distributed.

Table 7. Kolmogorov-Smirnov Normality Test Results

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			50
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		.58938812
Most Extreme Differences	Absolute		.118
	Positive		.118
	Negative		-.077
Test Statistic			.118
Asymp. Sig. (2-tailed)[c]			.077
Monte Carlo Sig. (2-tailed)[d]	Sig.		.076
	99% Confidence Interval	Lower Bound	.069
		Upper Bound	.083

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

Multicollinearity test shows the VIF (Variance Inflation Factor) value for variable X1 (peer assessment) is 1.080 and X2 (constructive feedback) is 1.080. This value is smaller than 10 and Tolerance is 0.24 and greater than 0.10, so it can be concluded that there is no multicollinearity.

Table 8. Multicollinearity test results of variables

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.339	.880		-.385	.702		
	Peer Assassement	.749	.074	.718	10.100	<,001	.024	1.080
	Feedback Construct	.306	.077	.282	3.965	<,001	.024	1.080

a. Dependent Variable: Pedagogic Skills

The heteroscedasticity test is used to test whether there is inequality of variation in the regression model. The heteroscedasticity test using the Glejser method produces a significance value of > 0.05 for both variables, so that heteroscedasticity does not occur.

Table 9. Variable Heteroscedasticity Test Results

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.095	.491		2.229	.031
	Peer Assassement	-.008	.041	-.181	-.197	.845
	Feedback Construct	-1.265E-6	.043	.000	.000	1.000

a. Dependent Variable: Abs_RES

3.3. Multiple Linear Regression Test

Multiple linear regression models are used to determine the simultaneous and partial influence of peer assessment (X1) and constructive feedback (X2) on pedagogical skills (Y). Because the regression coefficient value is plus (+), it can be stated that peer assessment (X1) and constructive feedback (X2) have a positive effect on pedagogical skills (Y). The results of the analysis show that the regression equation obtained is:

$$Y = 9.721 + 0.348X1 + 0.412X2$$

The regression coefficient value at X1 shows that every one unit increase in peer assessment will increase pedagogical skills by 0.348 units, assuming other variables are constant. Meanwhile, at X2, every one unit increase in constructive feedback will increase pedagogical skills by 0.412 units.

Table 10. Linear regression test results for research variables

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	9.722	.880		-.385	.702		
	Peer Assassement	.348	.074	.718	10.100	<,001	.024	41.080
	Feedback Construct	.412	.077	.282	3.965	<,001	.024	41.080

a. Dependent Variable: Pedagogic Skills

A regression model is deemed effective and satisfactory if a linear relationship exists between the independent and dependent variables. Linearity is defined as the relationship between variables that resembles a straight line, creating a linear pattern. The detection of a linear relationship is accomplished by visualization approaches, such as scatter plot graphs, illustrated in the subsequent variable images:

Figure 2. Scatter Plot Graph Variable Peer Assassment and Pedagogic Skills
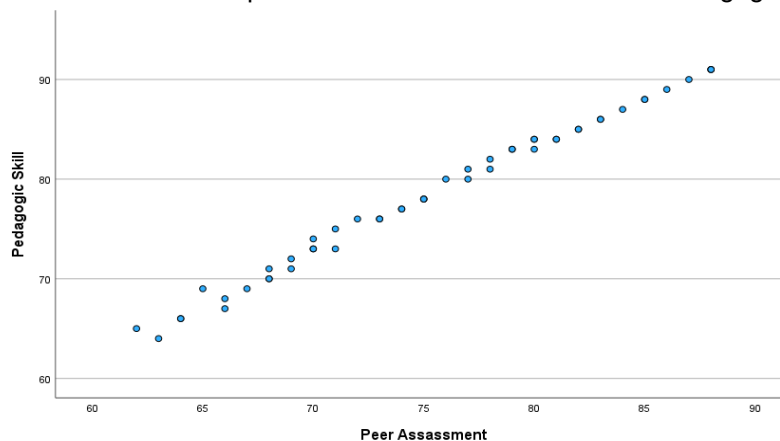
Figure 3. Scatter Plot Graph Variable Feedback Construct and Pedagogic Skills

Figures 2 and 3 illustrate the scatter plot technique, depicting the relationship between the peer assessment variable (X1) and pedagogic skills (Y), as well as the feedback construct variable (X2) and pedagogic skills (Y). Both figures present graphs that exhibit a linear distribution of data points extending from the bottom left corner to the top right corner. This indicates a linear and positive association between the peer assessment variable and the pedagogic skills variable, as well as between the feedback construct variable and the pedagogic skills variable.

3.4. Simultaneous Significance Test (F Test)

The F test results show a calculated F value of 24.173 with a significance of 0.000 ($p < 0.05$), which means that simultaneously, peer assessment and constructive feedback have a significant effect on students' pedagogical skills. This shows that the two independent variables together are able to explain variations in the dependent variable.

Table 11. Research variables F test results

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	628.498	2	1464.249	24.173	<,001^b
	Residual	17.022	47	.362		
	Total	645.520	49			

a. Dependent Variable: Pedagogic Skills
b. Predictors: (Constant), Feedback Construct, Peer Assassement

The coefficient of determination, or R Square value, must then be looked at in order to forecast the degree to which the Feedback Construct and Peer Assessment variables will both concurrently contribute to the pedagogic skills variable. According to Table 10, the significance (Sig.) value in the F test from the "ANOVA" output is <0.001, indicating it is less than <0.05. Consequently, it can be inferred that feedback skills and peer assessment concurrently affect students' pedagogical skills, and the criterion for the coefficient of determination in multiple linear regression analysis has been satisfied.

The "ANOVA" output indicates that the degrees of freedom (df) value in the regression column is 2. The result is derived from the equation K-1, where K is the total number of variables employed in this investigation. Given that K = 3, it follows that K - 1 = 3 - 1 = 2. To ascertain the residual value, the equation n – K is employed, where n represents the total sample size of 50; so, n – K = 50 – 3 = 47. The total degrees of freedom is the sum of the regression value and the residual value, 2 + 47 = 49.

Table 12. Coefficient Of Determination Value (R Square)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918^a	.864	.806	3.774

a. Predictors: (Constant), Feedback Construct, Peer Assassement
b. Dependent Variable: Pedagogic Skills

According to Table 11, the coefficient of determination is 0.864, or 86.4%, indicating that the feedback construct and peer assessment variables collectively account for 86.4% of the variance in pedagogic skills. The remaining percentage (100% - 86.4% = 13.6%) is affected by external variables not examined in this regression equation.

3.5. Partial Significance Test (t Test)

The t test analysis shows that the peer assessment variable has a calculated t value of 3.052 with a significance of 0.004, while the constructive feedback variable has a calculated t value of 3.762 with a significance of 0.000. Both values are significant at the 5% level ($p < 0.05$), which means that both peer assessment and constructive feedback partially have a significant influence on students' pedagogical skills.

Table 13. Research variable t test results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.722	.880		-.385	.702
	Peer Assassement	.348	.074	.718	3.052	<,001
	Feedback Construct	.412	.077	.282	3.762	<,001

a. Dependent Variable: Pedagogic Skills

4. **Discussion**

The research findings indicated that peer assessment has a substantial and beneficial effect on the enhancement of students' pedagogical abilities. These findings align with Vygotsky's theoretical concept of the Zone of Proximal Development (ZPD) and Skinner's reinforcement theory, which underscore that knowledge is developed through significant social interactions. In higher education, especially in practical courses like micro-teaching, peer assessment enables students to assume dual roles as evaluators and active participants in the learning process (Ehrhardt, 2009). This procedure encourages students to observe, evaluate, and critique their peers' teaching methods, thereby enhancing their metacognitive abilities to assess learning quality.

Vygotsky's Zone of Proximal Development theory and Skinner's suggested reinforcing mechanism play a significant role. The development of students' pedagogical skills can be facilitated by social interactions in peer assessments, as both of these theories contribute to our comprehension of this phenomenon (Lambright, 2024). The Zone of Proximal Development (ZPD) denotes the gap between the skills a person can attain with support—such as supervision or collaboration—and those they can acquire autonomously (Infante & Poehner, 2019). The ZPD is particularly pertinent in the context of peer assessment, as students are able to engage with their more experienced peers or those who can offer constructive guidance.

The reinforcement mechanism, proposed by B.F. Skinner, emphasizes how behavior can be enhanced by the consequences that ensue from the activity. Skinner differentiated between positive reinforcement, which involves the introduction of a favorable stimulus to enhance behavior, and negative reinforcement, which entails the elimination of an aversive stimulus to bolster conduct (Carrara, 2018). Positive Reinforcement in In the context of peer assessment, feedback can be provided by students who offer positive feedback on their classmates' teaching efforts, which can reinforce good behavior in teaching practice (Mitchell, 2014). Negative reinforcement for skill enhancement involves providing feedback that identifies areas requiring improvement or errors, which might diminish the probability of pupils repeating the same mistakes in the future. For instance, when a student receives constructive criticism regarding the enhancement of their interactions with peers, they can hone those skills to improve their pedagogical conduct.

The constructivist approach holds significant relevance in the implementation of differentiated learning, where teaching strategies are tailored to meet the diverse needs of learners. In this approach, the teaching process is not standardized, but is instead adapted to the individual student's readiness level, personal interests, and learning profile. By considering these personalized aspects, the constructivist approach offers opportunities for each student to learn in a manner that suits their own pace, style, and capacity. (Wibowo et al., 2025). This approach positions students as active agents in the knowledge construction process, fostering more meaningful, relevant, and contextually rich learning experiences. Therefore, learning becomes not only focused on achieving curriculum objectives but also on nurturing humanistic values and the holistic development of individuals.

Moreover, active engagement in the peer assessment process provides an opportunity for critical and reflective discussions that enhance students' pedagogical understanding. Students not only identify the strengths and weaknesses of teaching practices but also internalize effective pedagogical principles (Sluijsmans & Prins, 2006). This process expands their understanding of instructional strategies, student-centered learning approaches, and the importance of effective communication in the teaching and learning process. Thus, peer assessment is not just an evaluative tool but also a collaborative learning mechanism that significantly contributes to the development of comprehensive pedagogical competence.

Participation in peer assessment activities plays a crucial role in the development of students' metacognitive awareness. During the peer evaluation process, students are encouraged to recognize and understand the applicable assessment criteria and analyze the strengths and weaknesses of various teaching methods observed (Alcalá & Pueyo, 2016). Through this process, students not only enhance their ability to assess and provide constructive feedback but also apply the insights gained to their own teaching practices. This integration of material mastery and contextually relevant practices tailored to students' experiences during the learning process is a key benefit (Zorec, 2022). Such activities motivate students to critically reflect on the teaching process, thereby deepening their understanding of effective pedagogy.

On a broader scale, peer assessment contributes to the development of professional attitudes that demonstrate sensitivity to teaching quality and helps build the ability to think critically and analytically about teaching practices. Therefore, involvement in peer assessment not only directly improves students' pedagogical competence but also enriches their future experiences in managing and refining the teaching and learning process.

However, it is crucial to acknowledge that the effectiveness of peer assessment is heavily dependent on the quality of its implementation. Without a well-defined and comprehensive assessment rubric, as well as proper training for students to provide objective feedback, the process could lead to bias, potential interpersonal conflicts, or inaccurate assessment results (Mumpuni et al., 2022). In the context of this study, the implementation of peer assessments under the supervision of instructors and the use of standardized assessment rubrics significantly contributed to the validity and credibility of the assessment outcomes. With proper guidance and clear instructions, the peer evaluation process became more structured, transparent, and equitable, minimizing the potential for errors or inaccuracies in assessing pedagogical competence.

Additionally, the findings regarding constructive feedback provided by peers are noteworthy, as it was found to significantly influence the improvement of students' pedagogical skills. Within the framework of behaviorist theory, which is grounded in Pavlov's classical conditioning theory and Skinner's operant conditioning, learning behavior is understood as a response to external stimuli that are systematically conditioned. In this framework, learning is viewed as a process of behavioral change that results from reinforcement of the desired response (Sturges, 2020). Reinforcement—whether positive or negative—plays a central role in strengthening specific desired behaviors in an academic

context, including the development of students' pedagogical skills. Therefore, learning strategies that incorporate behaviorist principles, such as providing consistent and targeted feedback, can significantly impact the direction of learning behavior, facilitating more adaptive and productive changes.

In this context, constructive feedback serves as a form of reinforcement that can enhance positive learning behaviors and guide students toward improving weaker aspects of their teaching practices. Key factors such as the timeliness, relevance, and clarity of feedback are crucial in determining its effectiveness (Hodges et al., 2019). Additionally, constructive feedback, which not only evaluates results but also provides direction for improvement, holds substantial potential in encouraging students to engage in self-reflection on their teaching methods. This aligns with the reflective learning approach, which underscores the importance of critically evaluating learning experiences to enhance professional quality (Savaengkan & Chaijaroen, 2022). Therefore, constructive feedback is not merely an evaluative tool but also a strategic pedagogical instrument that supports the development of mature and self-aware teaching competencies.

In microteaching practice, the role of peers as providers of constructive feedback is significant and cannot be overlooked. Peers do not only correct deficiencies in teaching practices but also act as reflective partners who offer specific, targeted suggestions for improvement. Feedback focused on solutions, rather than simply offering criticism, fosters a supportive and collaborative learning atmosphere. This approach contributes to increasing students' intrinsic motivation, driving their internal desire to continue learning, improving, and innovating within their pedagogical practices. Students who receive feedback in such a constructive environment are more open to self-reflection and more engaged in evaluating the learning strategies they employ. Thus, solution-oriented and reflective peer feedback not only impacts teaching competence but also fosters the development of professional character and a more developed pedagogical awareness.

Although these two approaches differ in technique and outcomes, they share common ground in building pedagogical skills. Peer assessment emphasizes the contextual understanding of skills and collaboration (Brkić et al., 2024), while constructive feedback focuses on providing solutions and guidance for skill improvement (Prastiyani et al., 2020). The combination of both approaches offers students the opportunity to learn from multiple perspectives, broadening their thinking and enhancing their capacity for reflection.

Integrating these two methods within a single learning cycle can help maximize students' potential. After undergoing peer assessment, students gain insights from their peers, which are then deepened through more systematic feedback. This process reinforces their abilities to design lessons, deliver material, and conduct evaluations in a professional manner.
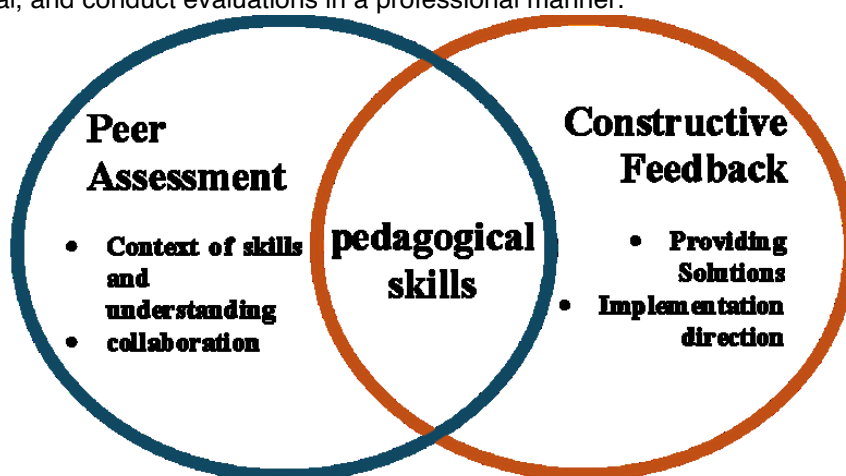

Figure 4. Integration among Variables.

This research significantly contributes to theory, practice, and policy in education. These results theoretically endorse the notion of reflective learning, wherein students actively participate in self-assessment and the enhancement of instructional skills via social interaction and constructive criticism. Practically, these findings strengthen the application of micro-teaching by emphasizing that it requires peer assessment and feedback, which can improve students' metacognitive skills in teaching. This research offers important implications for developing more effective training programs for potential PAI teachers by integrating collaboration, reflection, and skill reinforcement into the training curriculum. Consequently, the findings of this study enhance the academic literature and offer practical recommendations for the development of teacher education curriculum.

While the findings of this study indicate that peer assessment and constructive feedback positively contribute to improving students' pedagogical skills, several critical challenges must be addressed in their implementation. First, students' ability to provide objective and analytical assessments is not always uniform. This lack of preparedness may reduce the reliability of the assessment results, particularly if the process is not preceded by training or guidelines regarding evaluation standards and appropriate feedback techniques. Without a solid understanding of assessment instruments, students tend to offer superficial, vague, or biased comments.

Second, in the context of microteaching, where many participants are involved, a common challenge is providing personalized and comprehensive feedback. Limited session time and a high number of students often lead to feedback that is general, normative, and lacks the specificity needed to enhance students' technical and reflective skills. As a result, there are fewer opportunities for improvement in areas of teaching that require targeted development.

Third, cultural factors in the academic environment also play a significant role in determining the effectiveness of the feedback process. In certain contexts, prevailing social norms and values among students can create resistance to openly expressing criticism. Students may feel uncomfortable providing negative feedback to their peers or may hesitate to ask questions and voice opinions, which can ultimately weaken the reflective dialogue that is central to microteaching activities.

To address these challenges, efforts must be made to refine the pedagogical design and strategies for implementing microteaching. Instructors should not only act as technical facilitators but also serve as agents of academic culture, encouraging openness, intellectual courage, and reflective communication. These academic values should be systematically and consistently instilled from the beginning of the course. Furthermore, leveraging digital technology—such as online evaluation platforms that support anonymous feedback—can be a strategic solution to enhance the honesty, depth, and quality of feedback, while also fostering a more inclusive and supportive learning environment.

5. **Conclusion**

Based on the findings of this study, it can be concluded that peer assessment has a positive and significant impact on improving students' pedagogical skills. The evaluation process conducted among peers not only provides an opportunity for students to develop the ability to assess and provide constructive feedback but also strengthens their understanding of effective pedagogical principles. This activity aligns with Vygotsky's social constructivism theory, which emphasizes the importance of social interaction in knowledge construction. By serving as both evaluators and learners, students are able to internalize better pedagogical knowledge and skills, which in turn enhances their ability to manage the teaching and learning process in the future.

In addition, the implementation of constructivism in learning through peer assessment and the provision of constructive feedback significantly enhances students' metacognitive awareness. Through deep reflection, students are able to assess and improve their teaching practices while simultaneously

developing a professional attitude and critical thinking skills. The emphasis on solution-oriented and reflective feedback is essential in strengthening their pedagogical skills, encouraging continuous self-improvement, and optimizing their teaching approaches. As a result, this contributes to the development of more mature professional competencies, which in turn improves the quality of teaching in the future.

It is important to note, however, that the success of peer assessment and constructive feedback depends greatly on how well these approaches are implemented. The effectiveness of these methods relies heavily on having a clear and comprehensive assessment rubric, as well as providing students with proper training to give objective feedback. When instructors offer proper supervision and clear guidance, the peer evaluation process becomes more structured and credible. Consequently, integrating peer assessment and constructive feedback within a learning cycle allows for the optimal development of students' pedagogical skills. It creates opportunities for them to learn from various perspectives, deepening their understanding of, and ability to apply, relevant pedagogical principles.

Declarations

Author contribution statement
Amrullah initiated the idea and led all activities in this research paper. Eka Apriani and Muhammad Idris provided guidance and support throughout the completion of the research..

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