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The Relationship between Aesthetic Education Pedagogy and Innovative Skills: A Mediation Analysis Based on Teacher Competency

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ABSTRACT

In the contemporary educational landscape, fostering students' innovative capacities has emerged as a strategic imperative. Aesthetic education—characterised by the integration of artistic and creative modalities into the learning process—is widely regarded as a potential catalyst for such innovation. However, the pedagogical efficacy of these approaches may be contingent upon specific teacher-related variables. **Purpose:** This study investigated the impact of Aesthetic Education Pedagogy on students' innovative skills, with a particular focus on the mediating role of Teacher Competency and the moderating effect of Teachers' Pedagogical Knowledge. **Method:** Adopting a quantitative research design, data were gathered via a structured questionnaire administered to a sample of 349 students from diverse educational settings. Analytical procedures were conducted using SPSS (Version 26), comprising reliability assessment, Spearman's correlation, multiple regression analysis, and moderated mediation analysis via PROCESS Macro Model 5. All measurement scales demonstrated high internal consistency (Cronbach's Alpha > 0.90). **Findings:** The analysis revealed a significant positive association between Teacher Competency and Students' Innovative Skills ($\beta = 0.467$, $p < .001$). In contrast, Aesthetic Education Pedagogy exerted a small but statistically significant negative influence ($\beta = -0.106$, $p = .027$). Moreover, Teachers' Pedagogical Knowledge significantly moderated this direct relationship (interaction $\beta = -0.09$, $p = .04$). Collectively, the model accounted for 25.4% of the variance in students' innovation outcomes. **Implications:** The findings highlight the critical role of pedagogical expertise and instructional adaptability in translating aesthetic strategies into meaningful innovation. They suggest that without adequate teacher preparation and a flexible pedagogical orientation, the creative promise of aesthetic education may remain unrealised.

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Introduction

Background

There has been increasing emphasis on cultivating students' innovative capabilities through more interactive and stimulating instructional approaches. Among these, aesthetic pedagogy has emerged as a significant strategy due to its capacity to nurture imaginative thought, emotional resonance, and creative articulation in learners. This educational method incorporates artistic modalities, such as visual art, music, and performance, into conventional curricula to offer enriched and immersive learning encounters. Eslamian et al. (2017) observed that academic staff who received training in aesthetic instructional strategies exhibited notable improvement in their pedagogical effectiveness, as the approach encouraged enhanced engagement with learners and fostered stronger connections to educational content. Aesthetic and strategically structured pedagogical techniques can enhance students' cognitive and social competencies, especially within language learning environments. Despite both investigations highlighting the educational value of aesthetic experiences, their emphasis diverges in terms of application methods and measurable impacts across varied student populations and academic settings.

The link between pedagogical techniques and the cultivation of student creativity is also shaped by the proficiency of educators. Skilled teachers are better equipped to establish intellectually rich settings that support analytical reasoning, innovation, and autonomous learning. Beaudry et al. (2024) maintained that aesthetic-oriented instruction not only bolsters students' creative abilities but also augments educators' cultural awareness and flexibility, thus contributing to a more inclusive and creatively charged classroom environment. Nonetheless, their research focused predominantly on teachers' professional growth rather than directly evaluating its influence on student innovation. Ucus and Acar (2018) further contended that educators who display higher degrees of innovativeness are more inclined to implement creative instructional behaviours, which align closely with learner-centred and constructivist educational outcomes. In a related context, Digital platforms, such as blogging, can stimulate learners' creative thought processes and reflective writing abilities, thereby illustrating how instructional tools can indirectly foster innovation through heightened student engagement. Together, these scholarly contributions underscore the complex interplay between aesthetic pedagogy and teacher expertise in advancing students' creative skills, and point to the need for integrating both theoretical insight and practical application within contemporary educational frameworks.

Problem Statement

Although there is increasing awareness of the significance of fostering creativity and innovation within educational contexts, conventional instructional approaches often fall short in cultivating these competencies among students. Aesthetic pedagogy, which incorporates artistic and sensory dimensions into teaching and learning processes, offers promise in enhancing learners' capacity for innovation. Nevertheless, the specific pathways through which this form of pedagogy contributes to student outcomes remain insufficiently examined. In particular, the influence of teacher-related factors, such as professional competency and pedagogical expertise, as mediating or moderating variables

has not been thoroughly addressed in empirical studies. In the absence of a comprehensive understanding of these interrelationships, educational institutions may encounter challenges in adopting pedagogical models that effectively support the development of student innovation. This research aims to fill this conceptual and empirical gap by exploring the impact of aesthetic pedagogy on students' innovative capacities, with a focus on the mediating role of teacher competency and the moderating influence of pedagogical knowledge.

Study Questions

1. What influence does aesthetic pedagogy exert on the development of students' innovative capabilities?
2. In what way does teacher competency serve as a mediating factor in the relationship between aesthetic pedagogy and students' innovation skills?
3. To what degree does pedagogical knowledge among teachers moderate the association between aesthetic pedagogy and students' capacity for innovation?

Study Objectives

1. To investigate the influence of aesthetic pedagogy on the enhancement of students' innovative abilities.
2. To explore the mediating role of teacher competency in the relationship between aesthetic pedagogy and students' innovation skills.
3. To evaluate the moderating effect of teachers' pedagogical knowledge on the association between aesthetic pedagogy and students' capacity for innovation.

Research Significance

This research adds to the expanding discourse on educational innovation by examining the potential of aesthetic pedagogy to advance students' creative capacities, a skillset of growing importance in modern educational contexts. Through an analysis of teacher competency as a mediating variable and pedagogical knowledge as a moderating factor, the study provides meaningful perspectives on how instructional practices can be more effectively structured to foster innovation. The insights generated are expected to benefit curriculum designers, teacher education programmes, and policy stakeholders committed to promoting innovation-focused learning environments. Furthermore, the study offers a conceptual bridge between theoretical perspectives and practical implementation, advocating for a comprehensive pedagogical approach that supports students' cognitive, emotional, and creative growth. In doing so, it contributes to the evolution of instructional methodologies aligned with the demands of contemporary education.

Literature Review

Aesthetic Education Pedagogy and Its Role in Fostering Innovation

Aesthetic pedagogy, which incorporates artistic expression, creativity, and sensory engagement into the educational process, has increasingly been acknowledged for its potential to enhance students' critical and innovative thinking. As noted by Winner et al.

(2013), instruction that integrates the arts contributes significantly to the development of originality, problem-solving skills, and divergent thinking—core attributes of innovation. Such findings support the proposition that aesthetically enriched learning environments deepen both emotional and intellectual engagement.. This highlights that the mere use of digital tools does not inherently promote innovative thinking. In contrast, Prain et al. (2023) argued that when aesthetic strategies are meaningfully integrated into interdisciplinary instruction—such as employing dramatic techniques to teach scientific concepts—students demonstrate heightened creativity and conceptual understanding. For example, cross-curricular methods involving role-play and storytelling have been shown to foster originality among learners. These findings suggest that the innovative potential of aesthetic pedagogy is closely tied to the creativity and relevance of its implementation within specific educational contexts.

Beyond content delivery, aesthetic pedagogy also influences learner motivation and classroom participation—factors that are strongly associated with the stimulation of creative thought. This illustrates how gamified aesthetic elements can support learner engagement, which in turn may indirectly facilitate innovation by empowering students. In contrast, Clark-Fookes (2023) reported that although digital art platforms cultivated emotional engagement within virtual learning environments, they did not necessarily provide the structural scaffolding needed to promote more complex forms of innovation. Nonetheless, when aesthetic elements are embedded within well-designed instructional activities, they can enrich both the emotional and cognitive dimensions of learning. For instance, in a pilot initiative documented by Rodríguez-Gómez et al. (2024), engineering students tasked with developing user-focused solutions inspired by visual art principles produced designs that were not only more inventive but also more empathetic. In summary, while the efficacy of aesthetic pedagogy varies depending on contextual and methodological factors, there is increasing empirical support for its role in fostering innovation across diverse educational settings.

Innovative Skills in Education: Definition, Measurement, and Development

In the context of contemporary education, which is undergoing continual transformation, innovative skills—characterised by the ability to generate novel ideas, employ creative problem-solving techniques, and adapt effectively to evolving challenges—have become increasingly central to educational goals. Integrating technology through flipped learning models leads to enhanced active participation and the development of higher-order thinking among ESL lecturers, illustrating how pedagogical innovation can foster competencies linked to creativity. This suggests that innovation-related skills are more likely to emerge when learners are immersed in environments that promote independence, collaboration, and exploratory learning. Similarly, Robinson and Lee (2011) criticised traditional education systems for prioritising standardisation and rigid assessments, which often constrain students' creative capacities and limit opportunities for innovation in typical classroom settings. However, Beghetto (2016) contended that even within such structured environments, brief moments of creativity—termed micro-moments—can give rise to innovation, particularly when educators are equipped to recognise and support original student ideas. For instance, allowing learners to design their own assessment rubrics or collaborate on problem-based tasks may serve as opportunities

to exercise creative autonomy. Accordingly, the cultivation of innovative skills should extend beyond abstract theorisation and be embedded in practical pedagogical strategies that challenge learners to engage critically and adaptively with change.

Developing and assessing innovation requires comprehensive instructional models and evaluation tools that reflect the multifaceted nature of creativity in educational practice. Mobile-assisted vocabulary learning significantly enhances learner engagement and vocabulary retention, thereby providing evidence that digital platforms can encourage innovative learning behaviours even within language education. Nevertheless, Zeng et al. (2011) noted that many existing assessment instruments remain narrowly focused on conventional performance indicators, often overlooking real-world application and creative output. In light of this limitation, Lai and Viering (2012) advocated for performance-based and project-driven assessment models that engage students in solving open-ended problems, conducting inquiries, or producing original artefacts. These assessment approaches are more closely aligned with the demands of 21st-century learning environments. A tangible example of such innovation in practice can be seen in educational settings that adopt design thinking frameworks, where students participate in iterative cycles of ideation, prototyping, and testing, thus allowing for the authentic demonstration of innovative capabilities. In conclusion, the effective development and assessment of students' innovative skills must be grounded in learner-centred pedagogies and adaptable evaluation strategies, ensuring that learners are not only exposed to the principles of innovation but are also meaningfully evaluated on their ability to apply them in diverse contexts.

Teacher Competency as a Mediating Factor in Pedagogical Effectiveness

Teacher competency plays a central role in determining the success of pedagogical approaches, particularly those that incorporate innovative or learner-centred methodologies. Yunus et al. (2010) argued that the effective integration of ICT tools in English language instruction is largely influenced by teachers' digital proficiency and their confidence in applying technology in classroom contexts. This underscores the notion that the effectiveness of instructional tools is closely linked to educators' ability to implement them effectively. Skilled teachers can adapt their instructional techniques to suit the specific needs of their learners, thereby enhancing engagement and educational outcomes. Nonetheless, Students often responded positively to digital tools such as blogging, even in the absence of strong teacher guidance, suggesting that the inherent design of such tools may independently influence learner motivation. While this perspective has merit, the absence of pedagogical oversight often limits the full potential of these technologies. Tang (2021) highlighted that pedagogical knowledge and teacher responsiveness are essential for transforming surface-level digital interaction into deeper learning. For instance, blogging activities that incorporated structured teacher feedback not only improved students' fluency in writing but also fostered critical thinking and creativity. Consequently, teacher competency serves as a key mediating factor that translates educational strategies into meaningful and impactful learning experiences.

Moreover, teacher competency extends beyond familiarity with technology; it encompasses the ability to facilitate learning through appropriate instructional tools and

maintain effective classroom management. Adult TESL learners demonstrate improved performance when instructional methods are delivered metacognitively through rational and socio-affective strategies tailored to individual learning needs. This suggests that competent instructional delivery enhances the benefits of learner autonomy. However, Zhang et al. (2013) cautioned that teacher competency alone may be insufficient to ensure high classroom performance without consistent institutional support and access to professional development. In alignment with this, Sajon et al. (2022) contended that building competency through reflective practices and participation in collaborative learning communities has a sustained positive impact on instructional quality. For example, peer coaching among language educators led to the adoption of more adaptive and student-responsive teaching strategies. In conclusion, teacher competency is not merely a supplementary asset but a fundamental requirement for bridging theoretical pedagogy and classroom practice. It acts as the mediating force that determines whether an instructional model translates into successful learning outcomes.

Constructivist Learning Theory and Its Application in Aesthetic Pedagogy

Constructivist Learning Theory, rooted in the work of Piaget and Vygotsky, posits that learners actively construct their own understanding through interactions with their environment, prior experiences, and social engagement. Contrary to educational models that position learners as passive recipients of information, constructivism emphasises the active role of the learner, the value of reflection, and the influence of contextual factors in shaping comprehension. This conceptual foundation closely aligns with aesthetic pedagogy, which promotes interpretation, creativity, and expressive engagement through artistic and sensory experiences. Schunk (2012) affirmed that constructivist instruction facilitates deeper learning when students are immersed in rich and meaningful contexts—an element inherently present in aesthetic-based educational approaches.

Recent empirical studies support the relevance of constructivist principles within aesthetic pedagogy. For example, Tomljenović and Tatalović Vorkapić (2020) observed that students who engaged in visual art critique within classroom activities developed personal interpretations, thereby enhancing their conceptual understanding. The multisensory and symbolic nature of aesthetic experiences—such as analysing visual art, performing drama, or engaging in dance—offers dynamic contexts for knowledge construction, a process central to the constructivist framework. However, Mayer (2004) cautioned that discovery-based learning environments lacking adequate structure can lead to cognitive overload, suggesting that constructivist approaches must be thoughtfully designed to support effective learning. In response, Sawyer (2014) argued that meaningful learning occurs within a balance of structured guidance and open-ended exploration, where creativity is fostered alongside knowledge acquisition.

Within the scope of this study, constructivist theory provides a robust conceptual lens for understanding how aesthetic pedagogy may contribute to the development of students' innovation skills. It also highlights the critical role of teacher competency in facilitating this process, as educators function as scaffolds who guide, challenge, and support learners in making connections and constructing meaning. In this sense, constructivism not only justifies the incorporation of aesthetic strategies into pedagogical practice but also clarifies

how teacher mediation directly influences student learning outcomes. This dual focus reinforces the study's investigation into both instructional methods and teacher-related variables as interconnected components in the advancement of educational innovation.

Literature Gap

While aesthetic pedagogy has been extensively examined in relation to student engagement and creative development, limited empirical attention has been given to its specific influence on the cultivation of students' innovative skills within formal educational contexts. Much of the existing literature concentrates on general arts integration or creativity-focused instruction, without delving into the underlying mechanisms by which aesthetic strategies may contribute to innovation. Furthermore, the potential mediating role of teacher competency and the moderating influence of pedagogical knowledge have not been sufficiently investigated. This lack of comprehensive inquiry signals a critical need for research that explores how aesthetic pedagogy operates within structured classroom environments to support innovation, particularly through the lens of instructional effectiveness and teacher expertise.

Methodology

Research Method: Quantitative Approach

A quantitative research approach was adopted in this study to investigate the relationships among the core variables. As outlined by Boersma et al. (2016), quantitative methods provide a structured framework for measuring variables and testing hypotheses, thereby facilitating the development of conclusions that are generalisable across contexts. This approach was deemed appropriate, given the study's objective to examine the direct, indirect, and conditional associations among aesthetic pedagogy, teacher-related variables, and student innovation outcomes. The use of quantitative data enabled the application of statistical techniques, particularly mediation and moderation analyses, to determine both the extent and the specific conditions under which aesthetic instruction influences innovation.

Research Design: Primary Data Collection

Primary data were collected through a self-administered online questionnaire, which facilitated the use of standardised responses while enabling broad participant outreach. The instrument was structured into five distinct sections:

1. Demographic Information: This section gathered data on gender, age group, and educational background.
2. Aesthetic Education Pedagogy: Items measured respondents' perceptions regarding the frequency and meaningful integration of aesthetic practices within instructional settings.
3. Teacher Competency: This part assessed perceived levels of educator proficiency, adaptability, and professional readiness.

4. Teachers' Pedagogical Knowledge: Statements evaluated educators' expertise in instructional methods and the effectiveness of content delivery.
5. Students' Innovative Skills: Items focused on learners' abilities related to creativity, originality, and problem-solving.

A uniform five-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree," was applied across all sections to maintain consistency in measuring the constructs.

Sampling Technique

This study employed purposive sampling to select participants who had prior exposure to, or experience with, educational practices that incorporate aesthetic elements. As noted by Campbell et al. (2020), purposive sampling is appropriate when the selection criteria require participants to possess specific characteristics that align with the research objectives. Accordingly, the sample comprised individuals whose professional or educational backgrounds were either directly involved in, or meaningfully connected to, instructional approaches integrating aesthetic components. These included, but were not limited to, methods such as art-based instruction, storytelling, and other pedagogical techniques characterised by creativity and expressive engagement.

Target Population

The target population comprised students and educators from both secondary and post-secondary educational institutions. Inclusion criteria required that participants be actively engaged in learning environments where aesthetic pedagogical approaches were implemented. This ensured the relevance of their insights to the study's objectives. The sample encompassed a diverse range of educational levels and disciplinary backgrounds, thereby enabling the collection of varied perspectives on the influence of aesthetic pedagogy and teacher-related variables on the development of students' innovative capabilities.

Data Collection Procedure

Data were collected through an online questionnaire administered via Google Forms. The survey link was disseminated through academic forums, educator networks, and various social media platforms to reach a broad audience. Participants received a concise overview of the study's aims and were informed that their participation was entirely voluntary. Respondents completed the questionnaire at their own convenience, with no time restrictions imposed. All responses were automatically recorded in a secure digital repository and subsequently prepared for analysis upon the conclusion of the data collection period.

Data Analysis

The data were analysed using SPSS software. Initially, descriptive statistics were employed to provide a clear overview of participant characteristics and general response

patterns. Reliability analysis was then conducted to assess the internal consistency of the measurement scales across the key constructs. Subsequently, normality tests were performed to determine the appropriateness of the statistical techniques to be employed in further analysis. Inferential statistics, including correlation and multiple regression analyses, were applied to investigate the relationships between aesthetic pedagogy, teacher competency, pedagogical knowledge, and students' innovative skills. Furthermore, a moderated mediation model was tested using PROCESS Macro Model 5 (Clement & Bradley-Garcia, 2022), which was appropriate for simultaneously examining both mediation (indirect effects) and moderation (conditional effects) within a single analytical framework.

The analysis proceeded in two stages. First, the mediating role of teacher competency was assessed to explore whether it served as a mechanism through which aesthetic pedagogy influenced students' innovative skills. Second, the moderating effect of teachers' pedagogical knowledge was examined to determine whether it influenced the strength or direction of the direct relationship between aesthetic pedagogy and innovation outcomes. By utilising PROCESS Model 5, both pathways were analysed within an integrated structure. This approach provided insights into whether aesthetic education exerted a direct impact on innovation, and how this relationship was shaped by teacher-related variables. The combined use of SPSS and PROCESS Macro ensured a rigorous and comprehensive statistical analysis.

Ethical Considerations

The study adhered to strict ethical guidelines throughout all stages of the research process. Participants were fully informed about the nature, objectives, and procedures of the study, and their participation was entirely voluntary. Informed consent was obtained prior to data collection. Participants were assured that their responses would remain anonymous and confidential; no identifiable personal information was collected. All data were securely stored in password-protected digital files, accessible only to the research team. The study complied with the ethical protocols set by the affiliated institution, ensuring respect for participants' rights and the integrity of the research.

Data Analysis

Demographics

Gender

Table 1 presents the gender distribution of the study participants. Of the total sample, 166 individuals identified as female (47.6%), while 183 identified as male (52.4%). Although the distribution is slightly skewed towards male participants, the sample overall reflects a relatively balanced gender representation.

Table 1

Gender Base Division

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	166	47.6	47.6	47.6
	Male	183	52.4	52.4	100.0
	Total	349	100.0	100.0	

Age Group

Table 2 presents the age-wise distribution of the participants. The largest proportion belonged to the 28 years and above category (27.5%), followed by those aged 18–22 (26.1%), 23–27 (24.6%), and under 18 (21.8%). This age diversity contributes to the robustness of the study by supporting the generalisability of the findings across a range of educational stages and developmental cohorts.

Table 2

Age Wise Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18–22	91	26.1	26.1	26.1
	23–27	86	24.6	24.6	50.7
	28 and Above	96	27.5	27.5	78.2
	Under18	76	21.8	21.8	100.0
	Total	349	100.0	100.0	

Educational Level

As illustrated in Table 3, the largest segment of respondents comprised undergraduate students (37.0%), followed by high school students (33.5%) and graduates (29.5%). This distribution underscores that the majority of participants were either actively engaged in or had recently concluded formal education. Consequently, they were well-situated to offer informed perspectives on the implementation of aesthetic education pedagogy and its impact on the development of innovative competencies across varied academic trajectories.

Table 3

Education Level of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduate	103	29.5	29.5	29.5
	High School	117	33.5	33.5	63.0
	Undergraduate	129	37.0	37.0	100.0
	Total	349	100.0	100.0	

Normality Analysis

Table 4 presents the results of two statistical tests for normality—Kolmogorov-Smirnov and Shapiro-Wilk—both of which consistently indicated significant deviations from a normal distribution across all measured variables. Specifically, the Shapiro-Wilk test yielded a statistic of .680 for Aesthetic Education Pedagogy ($p = .000$), while similarly low

values were recorded for Teacher Competency (.589), Teachers' Pedagogical Knowledge (.537), and Students' Innovative Skills (.597), each with p-values less than .001. These uniformly significant results demonstrate that the dataset does not conform to the assumptions of normality, thus precluding the use of traditional parametric tests. The marked departure from the bell-curve distribution underscores the variability and heterogeneity of participant responses, thereby justifying the adoption of non-parametric techniques or robust regression models to ensure analytical rigour and statistical validity in subsequent analyses.

Table 4

Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Aesthetic Education Pedagogy	.367	349	.000	.680	349	.000
Teacher Competency	.389	349	.000	.589	349	.000
Teachers' Pedagogical Knowledge	.351	349	.000	.537	349	.000
Students' Innovative Skills	.376	349	.000	.597	349	.000

Aesthetic Education Pedagogy

To assess the normality of the Aesthetic Education Pedagogy variable, Q–Q plots were examined. As illustrated in Figure 1, the normal Q–Q plot indicates a clear deviation of data points from the reference diagonal, particularly at the tails, which suggests substantial departure from a normal distribution. Figure 2, depicting the detrended Q–Q plot, further supports this interpretation; the data points exhibit systematic fluctuations above and below the baseline, revealing a non-random, patterned deviation. Together, these graphical diagnostics corroborate the results of the Kolmogorov–Smirnov and Shapiro–Wilk tests, reinforcing the conclusion that the data do not adhere to a normal distribution. Consequently, the use of non-parametric approaches or more robust statistical techniques is warranted in the subsequent analyses.

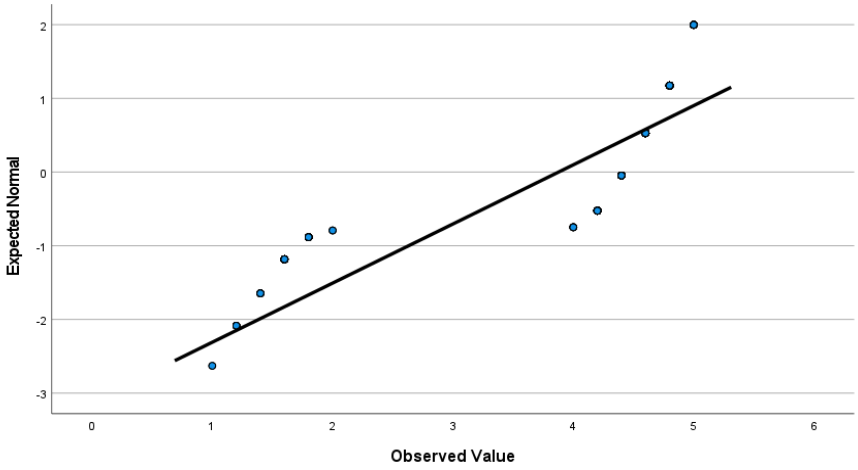

Figure 1: Normal Q-Q Plot of Aesthetic Education Pedagogy

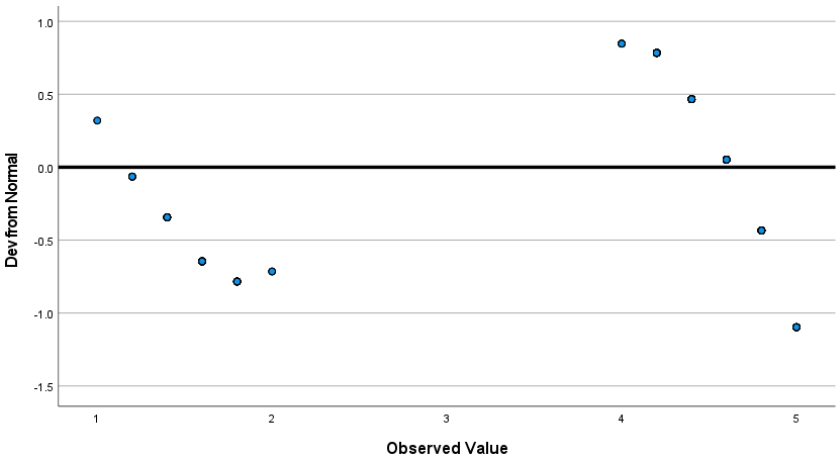

Figure 2: Detrended Q-Q Plot of Aesthetic Education Pedagogy

Teacher Competency

Figures 3 and 4 present the Normal Q-Q Plot and Detrended Q-Q Plot for Teacher Competency, respectively. In Figure 3, the data points deviate noticeably from the diagonal reference line, particularly at both lower and higher ends, indicating a departure from normality. This suggests that the distribution of Teacher Competency scores is skewed or influenced by outliers. Figure 4 further confirms this, as the detrended Q-Q plot shows systematic deviations from the horizontal zero line, with clustering of points below the line at the lower values and above the line at the higher values. These patterns indicate that the assumption of normality is not met for Teacher Competency. Therefore, non-parametric statistical methods would be more appropriate for analysing this variable to ensure the accuracy and reliability of results. This aligns with the findings from statistical normality tests such as Shapiro-Wilk or Kolmogorov-Smirnov, which would likely indicate significant non-normality.

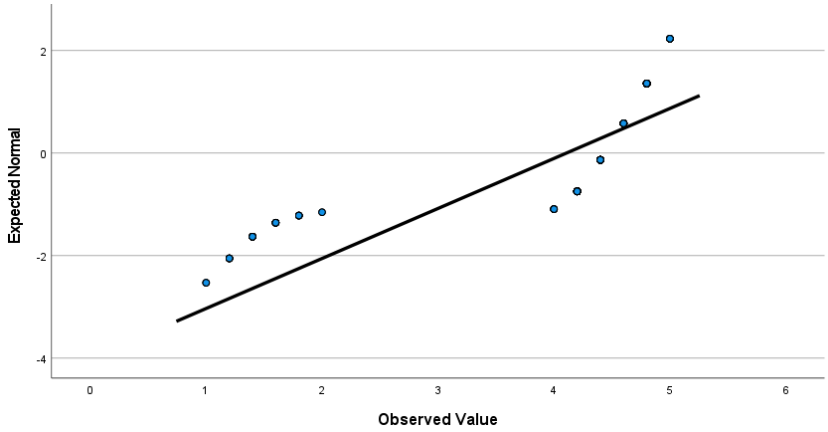

Figure 3: Normal Q-Q Plot of Teacher Competency indicating deviation from normality

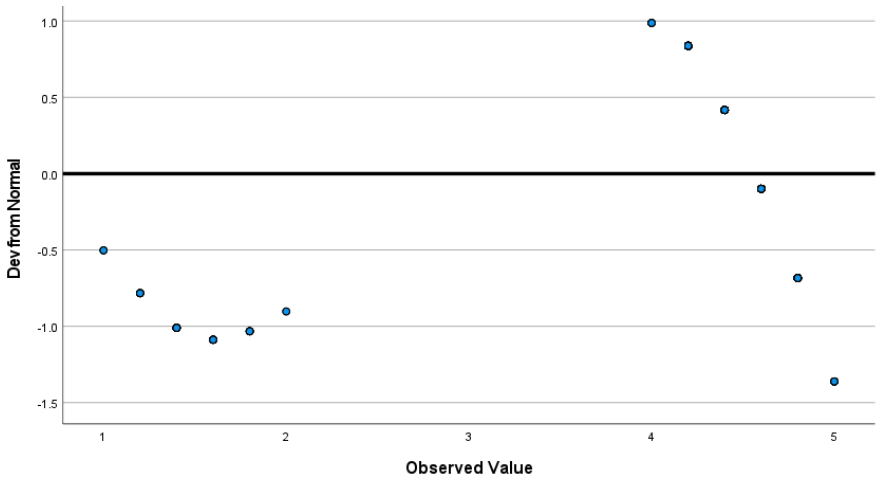

Figure 4: Detrended Q-Q Plot of Teacher Competency showing deviations from the expected normal distribution

Teachers' Pedagogical Knowledge

The normality of the Teacher Competency variable was examined using graphical methods. As presented in Figure 5 the normal Q–Q plot demonstrates a noticeable divergence of the data points from the diagonal reference line, particularly at the lower and upper extremes, indicating a departure from the expected normal distribution. Similarly, Figure 6 the detrended Q–Q plot reveals a consistent oscillation of data points above and below the horizontal baseline, forming a discernible pattern rather than a random dispersion. These graphical representations corroborate the findings of the formal normality tests, confirming that the distribution of the Teacher Competency variable deviates significantly from normality. In light of this, the application of non-parametric or more robust statistical techniques is deemed appropriate for subsequent analysis.

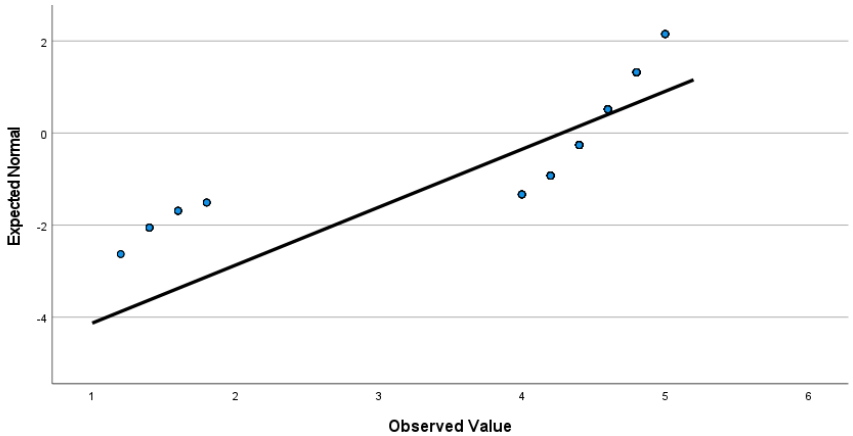

Figure 5: Normal Q-Q Plot of Teacher Competency

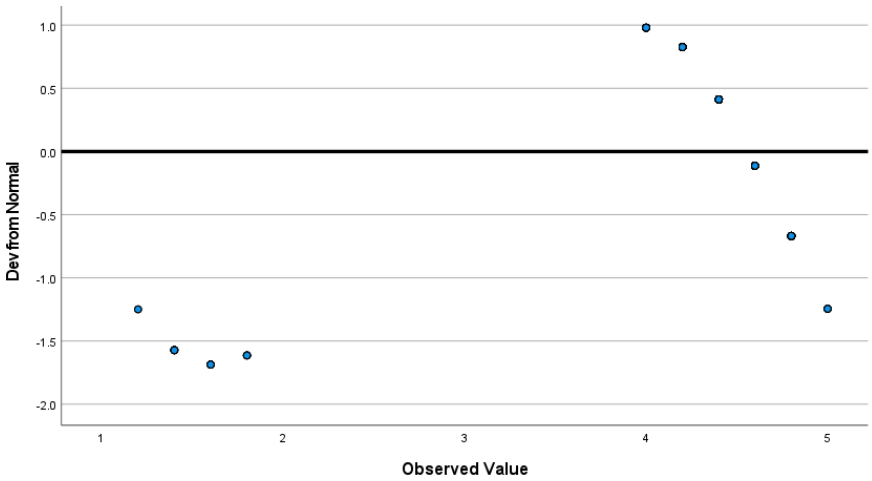

Figure 6: Detrended Q-Q Plot of Teacher Competency

Students' Innovative Skills

Figures 7 and 8 provide a graphical assessment of the normality of the Students' Innovative Skills variable. In Figure 7, the normal Q–Q plot illustrates a marked deviation of data points from the diagonal line, particularly at the lower and upper tails, suggesting a substantial departure from the assumption of normality. This observation is further substantiated by Figure 8, where the detrended Q–Q plot reveals a systematic wave-like distribution of points oscillating above and below the baseline, rather than displaying a random scatter. These visual patterns align with the outcomes of the formal normality tests, reaffirming that the data does not conform to a normal distribution. Consequently, the use of non-parametric or more flexible statistical techniques is warranted for accurate and reliable analysis.

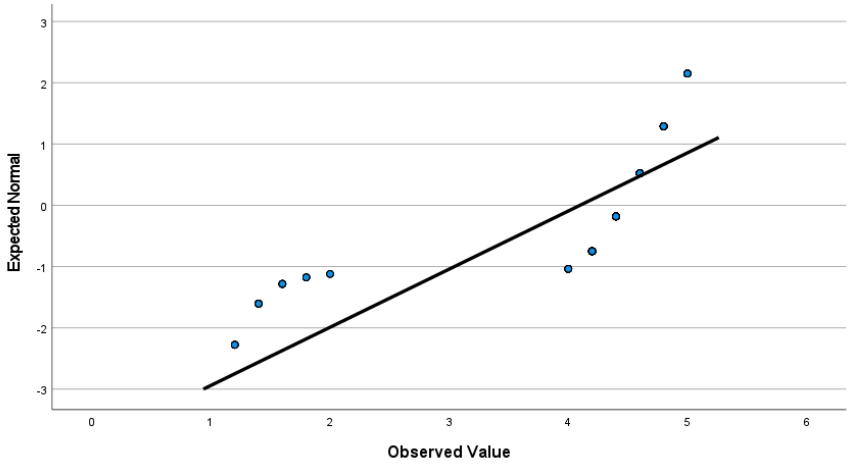

Figure 7: Normal Q-Q Plot of Students' Innovative Skills

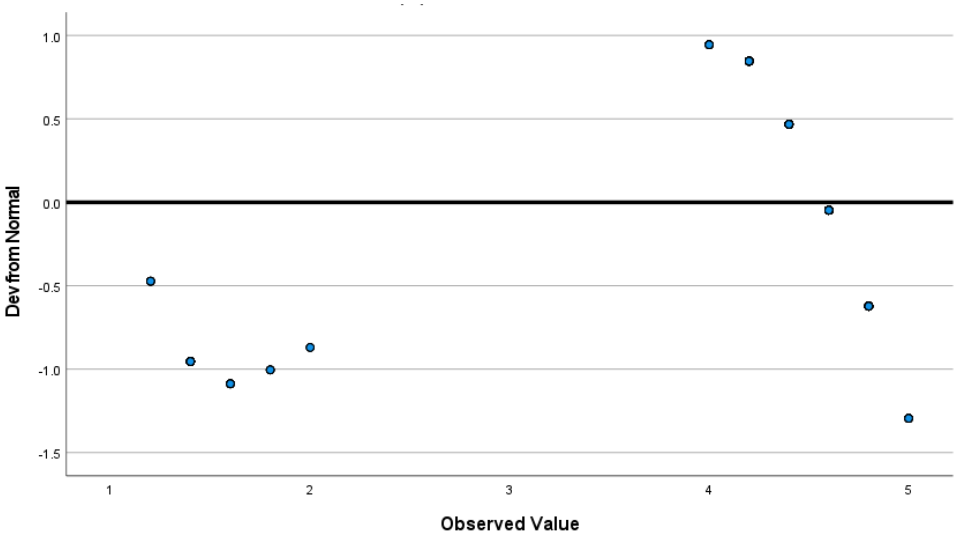

Figure 8: Detrended Q-Q Plot of Students' Innovative Skills

Reliability Analysis

Scale: Aesthetic Education Pedagogy

According to Table 5, the reliability analysis for Aesthetic Education Pedagogy yielded a Cronbach's Alpha value of 0.969, indicating an exceptionally high level of internal consistency among the five items used to assess the construct. This high coefficient suggests that the items are strongly interrelated and effectively measure the same underlying concept. Consequently, the scale demonstrates strong reliability and is deemed suitable for subsequent statistical analyses.

Table 5

Reliability Statistics for Aesthetic Education Pedagogy

Cronbach's Alpha	N of Items
.969	5

Scale: Teacher Competency

As shown in Table 6, the reliability analysis for the Teacher Competency scale yielded a Cronbach's Alpha value of 0.953, demonstrating a very high level of internal consistency across the five items. This result confirms that the scale is robust in measuring the construct of teacher competency, with the items exhibiting strong interrelatedness. Given this reliability, the scale requires no modification and is appropriate for use in subsequent statistical analyses.

Table 6

Reliability Statistics for Teacher Competency

Cronbach's Alpha	N of Items
.953	5

Scale: Teachers' Pedagogical Knowledge

As presented in Table 7, the reliability assessment of the Teachers' Pedagogical Knowledge scale produced a Cronbach's Alpha of 0.921, indicating excellent internal consistency across the five items. This high reliability suggests that the items yield consistent results in capturing the underlying construct. Consequently, the scale is deemed suitable for use in subsequent statistical analyses without the need for revision.

Table 7

Reliability Statistics for Teachers' Pedagogical Knowledge

Cronbach's Alpha	N of Items
.921	5

Scale: Students' Innovative Skills

As shown in Table 8, the reliability test of the Students' Innovative Skills scale yielded a Cronbach's Alpha of 0.955, indicating a very high level of internal consistency across the five items. This suggests that the scale provides a robust and reliable measure of the innovative skills construct, making it suitable for use in subsequent statistical analyses.

Table 8

Reliability Statistics for Students' Innovative Skills

Cronbach's Alpha	N of Items
.955	5

Correlation Analysis

The Spearman's rho correlation analysis revealed a weak negative relationship between Aesthetic Education Pedagogy and Students' Innovative Skills ($r = -.074$, $p = .169$), which was statistically non-significant. Similarly, Aesthetic Education Pedagogy demonstrated a minimal and non-significant correlation with Teachers' Pedagogical Knowledge ($r = -.018$, $p = .744$). In contrast, a statistically significant positive correlation was observed between Teacher Competency and Students' Innovative Skills ($r = .170$, $p = .001$), suggesting that greater teacher competency is associated with higher levels of student innovation. The relationship between Pedagogical Knowledge and Students' Affective Knowledge was negligible and non-significant ($r = -.001$, $p = .965$), as was the correlation between Pedagogical Knowledge and Students' Innovative Skills ($r = .003$, $p = .948$). These findings provide initial insight into the magnitude and directionality of associations among the core constructs investigated in the study (see Table 9).

Table 9

Spearman's Correlation Matrix among Key Variables

			Teachers' Pedagogical Knowledge	Students' Innovative Skills
Spearman's rho	Aesthetic Education Pedagogy	Correlation Coefficient	-.018	-.074
		Sig. (2-tailed)	.744	.169
		N	349	349
	Teacher Competency	Correlation Coefficient	.036	.170**
		Sig. (2-tailed)	.500	.001
		N	349	349
	Teachers' Pedagogical Knowledge	Correlation Coefficient	1.000	.003
		Sig. (2-tailed)	.	.948
		N	349	349
	Students' Innovative Skills	Correlation Coefficient	.003	1.000
		Sig. (2-tailed)	.948	.
		N	349	349

Note: ** Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis

Table 10 presents the summary of the regression model, indicating that Aesthetic Education Pedagogy, Teacher Competency, and Teachers' Pedagogical Knowledge collectively account for approximately 25.4% of the variance in Students' Innovative Skills (R^2 = .254). The R-value of 0.504 reflects a moderate association between the combined independent variables and the dependent variable. The adjusted R^2 value of .247 provides a more accurate estimate of the model's explanatory power within the broader population by accounting for the number of predictors. While the model demonstrates some predictive capability, the findings suggest that a substantial proportion of the variance in students' innovative skills is influenced by other factors not included in the current model. Therefore, further research is warranted to identify additional variables that may significantly contribute to the development of innovation-related outcomes in students.

Table 10

Regression Model Summary for Predicting Students' Innovative Skills

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.504[a]	.254	.247	.914441448865950

a. Predictors: (Constant), Teachers' Pedagogical Knowledge, Aesthetic Education Pedagogy, Teacher Competency

The ANOVA results presented in Table 11 reveal that the overall regression model achieves statistical significance ($F = 39.112$, $p < .001$), indicating that the combined influence

of Aesthetic Education Pedagogy, Teacher Competency, and Teachers' Pedagogical Knowledge exerts a meaningful effect on Students' Innovative Skills. The model explains a substantial proportion of the observed variance, as evidenced by the notably large regression sum of squares (98.116) relative to the residual sum of squares (288.490). This disparity suggests that the predictors contribute considerably to the explanatory power of the model, thereby reinforcing its robustness and empirical validity in capturing the dynamics underpinning students' development of innovative capacities.

Table 11

ANOVA Results for the Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	98.116	3	32.705	39.112	.000[b]
	Residual	288.490	345	.836		
	Total	386.607	348			

a. Dependent Variable: Students' Innovative Skills

b. Predictors: (Constant), Teachers' Pedagogical Knowledge, Aesthetic Education Pedagogy, Teacher Competency

As illustrated in Table 12, the regression coefficient analysis reveals that Teacher Competency exerts a statistically significant and positive influence on Students' Innovative Skills (B = .480, p < .001), indicating that elevated levels of teacher proficiency are associated with increased student innovation. In contrast, Aesthetic Education Pedagogy (B = –.089, p = .027) and Teachers' Pedagogical Knowledge (B = –.230, p < .001) exhibit statistically significant negative effects on the outcome variable. These findings suggest that although aesthetic pedagogical approaches and subject-matter expertise are integral to instructional quality, their impact on student innovation may be counterproductive if not mediated by flexible, context-sensitive teaching practices. The constant term denotes the baseline level of students' innovative skills when all independent variables are held at zero, providing a reference point for interpreting the relative contributions of each predictor.

Table 12

Regression Coefficients for Predicting Students' Innovative Skills

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.455	.360		9.600	.000
	Aesthetic Education Pedagogy	-.089	.040	-.106	-2.215	.027
	Teacher Competency	.480	.050	.467	9.647	.000
	Teachers' Pedagogical Knowledge	-.230	.063	-.173	-3.660	.000

a. Dependent Variable: Students' Innovative Skills

Analysis of Moderated Mediation was Performed Utilizing PROCESS Model 5

Model: 5

Y: Students
X: Aesthetic
M: TeacherC
W: Teachers
Sample Size: 349

OUTCOME VARIABLE: Teacher

Model Summary

R	R-sq	MSE	F	df1	df2	p
.21	.05	1.01	16.60	1.00	347.00	.00

Model

	coeff	se	t	p	LLCI	ULCI
Constant	4.11	.05	76.51	.00	4.00	4.21
Aesthetic	-.18	.04	-4.07	.00	-.26	-.09

OUTCOME VARIABLE: Students

Model Summary

R	R-sq	MSE	F	df1	df2	p
.51	.26	.83	30.62	4.00	344.00	.00

Model

	coeff	se	t	p	LLCI	ULCI
Constant	2.08	.21	9.89	.00	1.67	2.49
Aesthetic	-.09	.04	-2.22	.03	-.17	-.01
TeacherC	.49	.05	9.86	.00	.39	.59
Teachers	-.25	.06	-3.94	.00	-.37	-.12
Int_1	-.09	.05	-2.02	.04	-.19	.00

Product terms key:

Int_1: Aesthetic x Teachers

Test(s) of X by M interaction:

F	df1	df2	p
2.03	1.00	343.00	.16

Test(s) of highest order unconditional interaction(s):

R2-chng		F	df1	df2	p
X*W	.01	4.08	1.00	344.00	.04

Focal predict: Aesthetic (X)

Mod var: Teachers (W)

Conditional effects of the focal predictor at values of the moderator(s):

Teachers	Effect	se	t	p	LLCI	ULCI
-.08	-.08	.04	-2.03	.04	-.16	.00
.12	-.10	.04	-2.48	.01	-.18	-.02
.32	-.12	.04	-2.79	.01	-.20	-.04

Aesthetic Teachers Students.

BEGIN DATA.

-2.28	-.08	4.31
.52	-.08	4.08
.92	-.08	4.04
-2.28	.12	4.30
.52	.12	4.02
.92	.12	3.98
-2.28	.32	4.29
.52	.32	3.96
.92	.32	3.91

END DATA.

GRAPH/SCATTERPLOT=

Aesthetic WITH Students BY Teachers.

********** DIRECT AND INDIRECT EFFECTS OF X ON Y **********

Conditional direct effects of X on Y

Teachers	Effect	se	t	p	LLCI	ULCI
-.08	-.08	.04	-2.03	.04	-.16	.00
.12	-.10	.04	-2.48	.01	-.18	-.02
.32	-.12	.04	-2.79	.01	-.20	-.04

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TeacherC	-.09	.02	-.12	-.05

Level of confidence for all confidence intervals in output: 95.0000
Number of bootstrap samples for percentile bootstrap confidence intervals: 5000
W values in conditional tables are the 16th, 50th, and 84th percentiles.

****

Teachers Aesthetic

This study employed PROCESS Macro Model 5 (Hayes, 2022) to investigate a moderated mediation framework incorporating four principal constructs within the educational domain. Specifically, the model was designed to examine whether the relationship between Aesthetic Education Pedagogy (independent variable) and Students' Innovative Skills (dependent variable) is mediated by Teacher Competency, while simultaneously assessing whether the direct effect of Aesthetic Education Pedagogy on

student innovation is contingent upon the moderating influence of Teachers' Pedagogical Knowledge. The analysis was conducted using a sample comprising 349 participants, thereby ensuring adequate statistical power for model estimation.

Mediation Analysis: The Role of Teacher Competency

The initial stage of the moderated mediation analysis assessed the extent to which Aesthetic Education Pedagogy serves as a predictor of Teacher Competency. The results revealed a statistically significant negative association ($b = -0.18$, $p < .001$), suggesting that increased reliance on aesthetic teaching methodologies is correlated with diminished perceptions of teacher competency. This counterintuitive outcome may point to a potential disconnect between pedagogical innovation and professional readiness, whereby educators adopting aesthetic strategies might lack the requisite skills to implement them effectively—particularly in areas such as classroom management or interdisciplinary integration. The model accounted for approximately 5% of the variance in Teacher Competency ($R^2 = .05$), underscoring a modest yet meaningful explanatory capacity. Subsequently, the second regression model examined the effect of Teacher Competency on Students' Innovative Skills. Findings confirmed a robust and statistically significant positive relationship ($b = 0.49$, $p < .001$), reinforcing the premise that pedagogically competent teachers play a pivotal role in cultivating students' capacity for innovation and creative thinking. Mediation analysis further demonstrated a significant indirect effect of Aesthetic Education Pedagogy on Students' Innovative Skills through Teacher Competency (effect = –0.09, 95% CI: [–0.12, –0.05]). This indicates that the influence of aesthetic pedagogy on student innovation is partially transmitted through its impact on perceived teacher competency. Notably, the negative direction of this indirect pathway suggests that aesthetic practices—when not supported by sufficient teacher capability—may inadvertently suppress innovative outcomes among students by undermining perceptions of instructional efficacy.

Moderation Analysis: The Impact of Teachers' Pedagogical Knowledge

The model further assessed the moderating role of Teachers' Pedagogical Knowledge on the direct relationship between Aesthetic Education Pedagogy and Students' Innovative Skills. The interaction term (Aesthetic Education Pedagogy × Teachers' Pedagogical Knowledge) was statistically significant ($b = -0.09$, $p = .04$), indicating the presence of a moderation effect.

Conditional effects analysis reveals that the negative effect of Aesthetic Education Pedagogy on Students' Innovative Skills intensifies at higher levels of Teachers' Pedagogical Knowledge:

- Low Pedagogical Knowledge (16th Percentile): $b = -0.08$, $p = .04$
- Average (50th Percentile): $b = -0.10$, $p = .01$
- High (84th Percentile): $b = -0.12$, $p = .01$

This finding may appear counterintuitive; however, it suggests that when teachers possess high levels of pedagogical expertise, they may rely on more structured or rigid instructional frameworks that inadvertently constrain the creative potential of aesthetic approaches. In other words, extensive pedagogical knowledge may, at times, limit the

flexibility required to fully realise the benefits of aesthetic instruction. The results support a significant moderated mediation model, indicating that Aesthetic Education Pedagogy affects Students' Innovative Skills both indirectly through Teacher Competency and directly, with the strength of the direct effect contingent on levels of Teachers' Pedagogical Knowledge. Although aesthetic strategies hold promise for fostering innovation, their impact may be diminished if teachers are perceived as lacking competence or if rigid pedagogical structures inhibit instructional adaptability.

Discussion

This study investigated the influence of Aesthetic Education Pedagogy, Teacher Competency, and Teachers' Pedagogical Knowledge on students' innovative skills. The regression analysis revealed that Teacher Competency had a strong and statistically significant positive effect on student innovation ($B = 0.480$, $p < .001$). This suggests that as teachers demonstrate greater professional capability, students are more likely to exhibit higher levels of creativity and innovation. This aligns with the work of Darling-Hammond et al. (2017), who emphasised that competent educators foster innovation through student-centred approaches that promote inquiry, adaptability, and problem-solving. In contrast, Aesthetic Education Pedagogy exhibited a small but significant negative association with students' innovative skills ($B = -0.089$, $p = .027$). This finding implies that aesthetic-based teaching, when not properly structured or contextualised, may hinder rather than enhance creativity. Robinson and Lee (2011) similarly cautioned that poorly implemented aesthetic methods can suppress rather than nurture innovation, especially when they are applied rigidly rather than as flexible tools for engagement.

Surprisingly, Teachers' Pedagogical Knowledge also demonstrated a significant negative effect on student innovation ($B = -0.230$, $p < .001$). While pedagogical knowledge is generally considered essential for effective teaching, this result suggests that an overreliance on rigid or overly formal instructional techniques may inadvertently constrain students' creative expression. Sawyer (2014) warned of this risk, emphasising that excessive structure in teaching can limit spontaneity and exploratory learning—conditions under which innovation tends to flourish. Further insights emerged from the moderated mediation analysis using PROCESS Model 5. Aesthetic Education Pedagogy was found to significantly and negatively predict Teacher Competency ($B = -0.18$, $p < .001$), indicating that certain aesthetic teaching strategies may undermine educators' perceived effectiveness, particularly when implemented without appropriate training or support. Eslamian et al. (2017) noted that aesthetic approaches require specific instructional competencies, which, if lacking, can lead to reduced teacher efficacy and negative learning outcomes.

The mediation analysis revealed that Teacher Competency significantly mediated the relationship between Aesthetic Education Pedagogy and student innovation, with an indirect effect of -0.09 (95% CI [-0.12, -0.05]). This underscores that the effectiveness of aesthetic pedagogy in promoting innovation is dependent on teachers' professional competence. When aesthetic strategies are not well-executed, they may indirectly hinder students' innovative development by diminishing the instructional quality. Moreover, a significant interaction was found between Aesthetic Education Pedagogy and Pedagogical Knowledge ($B = -0.09$, $p = .04$), indicating a moderating effect. Specifically, as pedagogical

knowledge increases, the negative impact of aesthetic pedagogy on student innovation becomes more pronounced. This suggests that high pedagogical expertise, in the absence of creative flexibility, may amplify the constraints associated with poorly implemented aesthetic strategies. This is consistent with Winner et al. (2013), who argued that effective aesthetic instruction depends not only on pedagogical proficiency but also on teachers' creativity and adaptability. In summary, the findings indicate that aesthetic pedagogy does not inherently foster innovation; its success is contingent upon teacher competency and a balanced pedagogical framework that integrates structure with creative freedom. Student innovation flourishes most when teaching approaches are both methodologically sound and responsive to imaginative exploration.

Conclusion

This study examined the impact of Aesthetic Education Pedagogy on students' innovative competencies, focusing on the mediating role of Teacher Competency and the moderating effect of Pedagogical Knowledge. Using PROCESS Macro Model 5, findings revealed that Teacher Competency significantly mediates the relationship, highlighting that effective, adaptable, and confident teaching fosters student innovation. However, a surprising negative direct effect of aesthetic pedagogy was observed, suggesting that without appropriate training and contextual flexibility, such methods may hinder creativity. This effect was amplified under high pedagogical knowledge, indicating that rigid instructional frameworks can constrain the benefits of aesthetic approaches. These results suggest that innovation arises not from pedagogy or expertise alone, but from their dynamic integration by reflective and responsive educators. The implications of these insights are profound for both educational policy and teacher preparation. Programmes designed to prepare educators must prioritise the cultivation of pedagogical dexterity, creative facilitation, and adaptive instructional design, moving beyond a narrow focus on theoretical knowledge transmission. Professional development should explicitly equip teachers with the cognitive and affective tools required to implement aesthetic strategies meaningfully and to reconcile the demands of curriculum fidelity with the affordances of learner-centred, inquiry-driven pedagogy. In summation, advancing student innovation necessitates a holistic and contextually responsive instructional ecology. While Aesthetic Education Pedagogy offers considerable promise, its efficacy is significantly moderated by the pedagogical disposition and instructional competence of the educator. A sustained commitment to developing teachers who are not only knowledgeable but also inventive, reflective, and adaptive is essential for cultivating the kind of transformative learning environments in which innovation can authentically emerge.

Study Limitations and Future Directions

This study is not without its limitations, several of which are inherent to its methodological design. Foremost, the adoption of a cross-sectional research framework imposes constraints on the ability to establish causal relationships among the investigated variables. While the statistical associations observed offer valuable insights, they cannot definitively confirm directional or temporal effects. Employing a longitudinal design in future inquiries may yield a more nuanced understanding of how teacher practices and student innovation evolve and interact over time. Secondly, data collection was conducted

through self-reported instruments, which, although efficient for gathering subjective perceptions, remain vulnerable to biases such as social desirability and self-presentation effects. Participants may have consciously or unconsciously responded in ways they deemed favourable or appropriate, potentially compromising the authenticity of the findings. Triangulating self-report data with other sources, such as peer evaluations or behavioural observations, would strengthen future research validity. Thirdly, the sample population was limited to students from a specific educational context and academic background. Consequently, the generalisability of the findings is constrained. The extent to which these outcomes are applicable to students in diverse institutional, cultural, or disciplinary settings remains uncertain. Broader and more heterogeneous sampling strategies are recommended to enhance external validity and contextual relevance.

Looking forward, future investigations would benefit from integrating qualitative methodologies to gain deeper insight into the application of aesthetic pedagogy within authentic learning environments. In-depth interviews, classroom ethnography, and participant observation could illuminate the subtleties of teacher-student interactions and pedagogical dynamics that quantitative tools might overlook. Furthermore, it would be advantageous to explore additional contextual and situational variables—such as institutional support, leadership style, or student motivational factors—that may moderate or mediate the impact of aesthetic educational strategies on innovation outcomes. Experimental or mixed-method designs could help delineate the specific conditions under which aesthetic approaches are most effective in cultivating students' innovative capacities.

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