International Journal of Modern Education
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 148-164
DOI: 10.35631/IJMOE.724010

INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

TRANSFORMATIONAL LEADERSHIP: CATALYZING EDUCATIONAL INNOVATION IN VOCATIONAL COLLEGES OF PULAU PINANG

Azreen Anoar[1*], Al Amin Mydin[2], Nurul Aliah Rushdi[3]

[1] School of Education Studies, Universiti Sains Malaysia, Malaysia
Email: azreenanoar@gmail.com
[2] School of Education Studies, Universiti Sains Malaysia, Malaysia
Email: alamin@usm.my
[3] School of Education Studies, Universiti Sains Malaysia, Malaysia
Email: aliahrushdi93@gmail.com
[*] Corresponding Author

Article Info:

Article history:
Received date: 03.12.2024
Revised date: 27.12.2024
Accepted date: 08.01.2025
Published date: 03.03.2025

To cite this document:

Anoar, A., Mydin, A., & Rushdi, N. A. (2025). Transformational Leadership: Catalyzing Educational Innovation In Vocational Colleges Of Pulau Pinang. *International Journal of Modern Education, 7* (24), 148-164.

DOI: 10.35631/IJMOE.724010

Abstract:

The rapid advancements in social and technological spheres necessitate continuous reforms and modifications within the education system. Similar to other higher educational institutions, vocational colleges are actively implementing reform and transformation initiatives, which drive the demand for innovation within the classroom. This study explores the influence of transformational leadership on the innovative approaches employed by vocational lecturers in Pulau Pinang. While the significance of innovation in vocational education is widely acknowledged, there is limited understanding of the specific impact that leadership styles have on this dynamic. This research investigates the relationship between transformational leadership and the extent of innovation among instructors in vocational education. Utilizing a survey methodology, this study employed a set of questionnaires encompassing both transformational leadership and educational innovation variables. A sample of 229 lecturers was randomly selected, comprising 144 female and 85 male lecturers. The findings indicate a high level of educational innovation in vocational colleges, with PLS-SEM analysis revealing that transformational leadership significantly enhances the adoption of creative teaching strategies. This study contributes to the theoretical understanding of educational leadership and innovation while providing practical insights for policymakers and educational leaders aiming to foster innovation in vocational education, particularly in Malaysia.

International Journal of Modern Education
IJMOE
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Keywords:

Educational Innovation, Educational Leadership, Technical And Vocational Education Training (TVET), Transformational Leadership, Vocational College

Introduction

Transformational leadership's ability to inspire, motivate, and promote organizational change, is increasingly vital for educational innovation institutional development (Bohari et al., 2024; Nazari et al., 2024). The limited industry participation in vocational education highlights significant challenges in aligning vocational curricula with workplace realities and technological advancement (Yu & Tsao, 2024). In vocational education settings, where both practical skills and theoretical knowledge must be integrated, transformational leadership can be particularly impactful. Research shows transformational leadership's superiority in fostering innovation, particularly in technology sectors, compared to traditional approaches that often lack adaptability (Dupont & Clercq, 2024).

In vocational colleges, where practical skills and theoretical knowledge integration is crucial, transformational leadership significantly enhances educational quality promoting innovative teaching methods and encouraging adaptive learning environments (Mugo & Kiboss, 2023). However, cultural factors like collectivism and power distance significantly influence leadership effectiveness in Asian context (Koo & Park, 2018). These leaders enhance faculty morale, set high academic standards, and facilitate organizational innovation through knowledge sharing and collaboration (Firmansyah et al., 2022).

The landscape of educational innovation has expanded considerably, encompassing various modifications and introductions in technological tools, pedagogical techniques, and educational resources (OECD, 2021). The finding that 70% of vocational instructors possess only basic digital literacy skills emphasizes the urgent need for technology integration in resource-constrained settings (Lin, 2024). Studies by Jusuf et al. (2020) and Oliván-Blázquez et al. (2022), demonstrate that hybrid learning models, which combine traditional in-class activities with online resources, can significantly enhance student satisfaction and improve performance outcomes. Furthermore, the incorporation of digital tools and artificial intelligence (AI) has shown promising results in developing students' teamwork and communication skills (Almusaed et al., 2023; Suciani et al., 2023).

Understanding transformational leadership's role in driving educational innovation becomes particularly relevant for Pulau Pinang's vocational colleges. As these institutions adapt to technological changes and industry demands, examining leadership effectiveness in promoting innovation and institutional advancement is crucial. This study investigates how transformational leadership practices influence educational innovation within Pulau Pinang's vocational colleges, focusing on leaders' facilitation of technological integration, pedagogical advancement, and fostering an environment conducive to continuous improvement and innovation. Through transformational leadership, leaders create environments that embrace change, encourage innovation, and prioritize continuous improvement (Bass & Riggio, 2006). They foster shared vision, provide intellectual stimulation, and offer individualized support, enabling institutions to adapt to technological advancements and evolving pedagogical needs (Sheehan et al., 2020; Ting et al., 2021).

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IJMOE
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Study Issues

The rapid development of technology and the demands of a global society have transformed education (Alshammary & Alhalafawy, 2023; Shehaj, 2022). However, implementing innovative teaching practices faces several challenges.

Higher education institutions, particularly vocational colleges, struggle to develop comprehensive educational strategies that integrate theoretical and practical learning to meet contemporary job requirements (Bouw et al., 2021; Criollo-C et al., 2021). According to Dinc (2019), lecturers at vocational colleges encounter numerous obstacles when attempting to incorporate technology into their classrooms, including a lack of funding, resources, knowledge, time, and parental involvement. Some academics respond unfavourably to these issues (Lee et al., 2019; Wan Ali Akbar Wan Abdullah et al., 2020), feeling uncomfortable with the status quo, lacking technological expertise, or receiving inadequate support from leadership.

To address these challenges, transformational leadership has emerged as a crucial element in promoting educational innovation. Elrehail et al. (2018) assert that innovation, information sharing, and transformational leadership are positively correlated. Jabbar (2022) further supports this claim, indicating that transformational leadership is the most effective style for managing educational innovation compared to other approaches. Despite these insights, Al-Husseini et al. (2019) highlight a significant research gap in the connection between transformational leadership and educational innovation. Additionally, Idi et al. (2021) point out a discrepancy in research focus, noting that there are fewer Asian studies in the literature than Western ones, and these tend to concentrate more on lecturers' preparation than on leadership qualities.

This study underscores the urgent need for a comprehensive examination of the effects of transformational leadership on educational innovation, particularly concerning vocational college instructors. By elucidating how transformational leadership can enhance information exchange and foster innovative teaching in vocational schools, this research aims to fill existing gaps in knowledge and application.

Objectives

Objective 1: Identify the level of transformational leadership among directors of Vocational Colleges in Pulau Pinang.

Objective 2: Identify the level of educational innovation among lecturers at Vocational Colleges in Pulau Pinang.

Objective 3: Identify the influence of transformational leadership on educational innovation among lecturers at Vocational Colleges in Pulau Pinang.

Literature Review

This section examines five key areas essential to understanding the relationship between leadership and innovation in education. These areas include transformational leadership, educational innovation, the influence of transformational leadership on educational innovation, study issues, and gaps in current research.

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Transformational Leadership

Transformational leadership, introduced by Burns (1978) and rooted in Weber's (1946) ideas, emphasizes the relationship between leaders' practices and followers' psychological states. Burns described it as a reciprocal process where leaders leverage economic and political resources to inspire and motivate followers to achieve common goals through shared values and beliefs. In contrast to transactional leadership, which focuses on resource exchange, Bass and Riggio (2010) characterize transformational leadership by enthusiasm, charisma, and inspiration. Jamal Ali and Anwar (2021) support this view, noting that charismatic leaders generate pride, trust, and respect among followers.

Research further indicates that transformational leadership positively impacts employee performance by fostering commitment, enhancing work engagement, and reducing turnover intention (Chevalino & Ismail, 2022; Ntseke et al., 2022; Zahara Tussoleha Rony et al., 2023). Higher educational institutions, including vocational colleges, can benefit from and implement transformational leadership (Liu, 2024). Studies by Alam et al. (2023) and Asefa and Kant (2023) highlight the positive impact of transformational leadership on teacher performance, staff engagement, deeper learning implementation, and organizational productivity in educational settings. This leadership approach aligns well with the objectives of educational institutions to enhance teaching quality, student learning outcomes, and overall school effectiveness. It focuses on motivating and developing individuals, promoting collaboration, recognizing accomplishments, and encouraging involvement (Barnová et al., 2022). Transformational leadership drives positive change and progress within educational organizations by creating a future-focused vision, providing support, and fostering opportunities for continuous learning.

Educational Innovation

Innovation is a comprehensive concept that involves the introduction of unique solutions, the creation of new value, and the utilization of scientific and technological advancements to drive progress and development (Łuszczyszyn & Papież, 2023). While innovation often originates in the business world, it is also embraced by educators and becomes a crucial component within educational organizations.

Innovation in education can take various forms, such as developing new digital resources and curricula or introducing advanced learning management systems and online courses. Enhancing communication between teachers, students, and parents, innovation also involves the use of advanced instructional tools like virtual laboratories and interactive maps. These technological advancements are revolutionizing education, transforming not only how knowledge is acquired and disseminated but also how educational institutions are managed (OECD, 2021). A report by Stéphan Vincent-Lancrin et al. (2019) outlines four key benefits of innovation in education: improving learning outcomes and the quality of education, promoting equity and equality, enhancing efficiency, and upgrading the education system through social and economic change.

The Influence of Transformational Leadership on Educational Innovation

Transformational leadership has been found to significantly foster innovation in education. Given its emphasis on group work and management across various skill contexts, transformational leadership is particularly suited for educational settings (Antonopoulou et al., 2021). Owusu-Agyeman (2019) asserts that transformational leadership promotes innovation

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through five essential components: decision-making, motivation, communication flow, involvement, and the use of communication. Through idealized influence, individualized consideration, and intellectual stimulation, transformational leaders inspire educators to develop innovative work methods and ideas. Transformational leadership employs unique motivational mechanisms to enhance worker performance, job satisfaction, and stress reduction (Lia Retno Widyaningrum & Lia Amalia, 2023; Ningsih et al., 2023).

Several approaches illustrate how transformational leadership impacts educational innovation. Research by Wan Ali Akbar Wan Abdullah et al. (2020) indicates that lecturers are significantly influenced to innovate by leaders who provide support, encouragement, guidance, and clear concepts. This aligns with Serdyukov's (2017) Educational Innovation Model, which emphasizes the role of administrators in fostering an innovation ecosystem by designating innovation as a work target. According to Novitasari (2020), transformational leadership maximizes instructors' commitment to innovative teaching by energizing and inspiring them with visionary direction and a thorough understanding of their needs. Consequently, dedicated instructors exhibit greater job satisfaction and performance, leading to higher-quality student outcomes. The results of the earlier study are summarized in Table 1.

Table 1: Summary of Past Findings

Author(s)	Year	Focus	Findings	Gaps
Zahara Tussoleha Rony et al., Alam et al.	2023	Teacher performance and engagement	Transformational leadership improves teacher performance, engagement, and organizational productivity	Limited to specific regions and lacks detailed mechanisms of influence
Mugo & Kiboss	2023	Technical training	Transformational leadership enhances quality	Limited geographical scope
Firmansyah et al., Antonopoulou et al.	2022, 2021	Vocational and educational leadership	Leadership promotes adaptive teaching strategies and is linked to teacher engagement	Lacks focus on technology and insufficient focus on Asia
Jamal Ali & Anwar	2021	Leadership characteristics	Charismatic leadership builds pride, trust, and respect among followers	Focused mainly on general leadership traits
Novitasari, Wan Abdullah et al.	2020	Innovative teaching and educational innovation	Visionary leaders maximize instructor commitment to innovation; supportive leaders significantly influence lecturers to innovate	Lacks longitudinal studies and diverse cultural contexts

Method

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EISSN: 2637-0905
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This study employs a quantitative approach with a correlational research design, as recommended by Creswell (2021). The correlational design is appropriate as it allows for the statistical assessment of the association between educational innovation and transformational leadership without requiring any adjustments or interventions (Memon et al., 2020). A structured survey was developed, integrating tools for measuring educational innovation (Stéphan Vincent-Lancrin et al., 2019) and transformational leadership (Jantzi & Leithwood, 1996), as illustrated in Figure 1. Data collection was conducted using a cross-sectional survey approach, which facilitates generalization to the population without the need for adjustments or interventions (Memon et al., 2020). This method reduces costs and the potential for data loss while enabling the rapid collection of substantial information (Pandey et al., 2023).

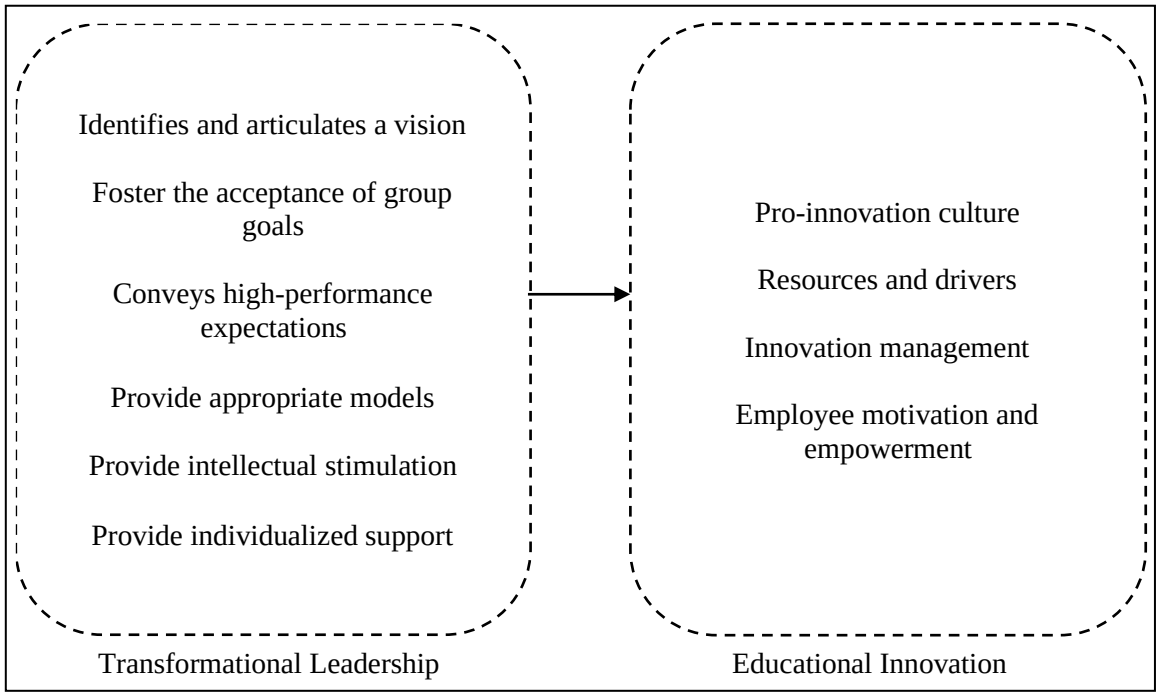

Figure 1: Conceptual Framework

Population and Sampling

This study uses purposive sampling, as recommended by Creswell (2021), to target participants from five Vocational Colleges (KV) in Pulau Pinang, Malaysia. Purposive sampling was deemed appropriate due to the homogeneity of KV lecturers across Malaysia, which ensures that the findings are likely representative of the broader vocational education context. Additionally, this method was selected for its practical benefits, including affordability, ease of access to the sample frame, and timeliness, allowing the study to gather relevant data within an efficient timeframe. Stratified sampling was employed to ensure that lecturers from various demographic subgroups were adequately represented, thereby enhancing the generalizability of the findings. The total population of lecturers across these five KVs is 498. Based on the proportional sampling technique by Krejcie et al. (1970), a sample size of 218 lecturers was determined.

Data collection was conducted through an online survey created using Google Forms, chosen for its accessibility and ease of distribution. With the cooperation of college administrations, the survey was emailed to 400 potential respondents via institutional messaging platforms and

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official email addresses. To boost response rates, a reminder was sent halfway through the two-week survey period. To ensure participant anonymity and encourage honest responses, no personally identifiable information was collected, thereby preserving data integrity. This approach aimed to minimize response bias and enhance data reliability. As shown in Table 2, an impressive 93% of the 229 completed surveys were suitable for data analysis. This high response rate significantly enhanced the study's representativeness and reliability, providing a robust foundation for the subsequent analysis.

Table 2: Summary of Questionnaires Distributed and Response Rate

Item	Response Rate	Percentage of Questionnaires Distributed
Sample size	218	-
Questionnaires distributed	400	-
Returned questionnaire	246	62%
Questionnaires can be used	229	93%

Research Analysis

Five Likert Scale questionnaires 1 to 5 are used to give respondents a choice to answer the questions. To obtain the mean score and standard deviation of all variables, the mean level interpretation is categorized into five, namely 1.00 to 1.89, 1.90 to 2.69, 2.70 to 3.49, 3.50 to 4.29 and 4.30 to 5.00 as in Table 3.

Table 3: Interpretation of the Mean Stage

Mean Score	Interpretation
1.00 to 1.89	Very Low
1.90 to 2.69	Low
2.70 to 3.49	Moderate
3.50 to 4.29	High
4.30 to 5.00	Very High

Source: BPPDP (2006) and Hord (1997)

The analysis employed the Type I Hierarchical Component Model (HCM) in Partial Least Squares Structural Equation Modelling (PLS-SEM), utilizing a reflective-reflective approach for the two primary constructs: Educational Innovation and Transformational Leadership. Sarstedt et al. (2019) recommend a two-step analysis process. According to Ramayah et al. (2018), the first stage involves assessing the First-Order Measurement Model, focusing on the Heterotrait-Monotrait (HTMT) ratio, Convergent Validity (AVE), and Internal Consistency (CR and loadings), as illustrated in Table 4. In the second step, latent variable scores are introduced as new variables to calculate latent variable scores as indicators for Higher-Order Constructs in the second-order PLS path model.

Following Hair et al. (2019), the structural model analysis begins by assessing collinearity (VIF) between constructs and then evaluates the relevance and significance of structural model relationships through path coefficients. P-values and t-values are determined for each variable using the bootstrapping technique. The third stage involves finding the R^2 value of endogenous variables, with Hair et al. (2011) and Henseler et al. (2009) proposing that substantial, moderate, and weak R^2 values are 0.75, 0.50, and 0.25, respectively. Next, the effect size (f^2) is calculated, with Cohen et al. (2011) classifying values of 0.02, 0.15, and 0.35 as indicating

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small, moderate, and large effects, respectively. Lastly, the blindfolding technique is employed to evaluate the predictive relevance (Q^2) of the model; values greater than zero indicate predictive capability (Hair et al., 2019).

Table 4: Measurement Model Analysis

Valuation	Index Name	Guidelines
Internal Consistency	Composite Reliability (CR)	CR ≥ 0.7 – 0.9 (Satisfactory) CR ≥ 0.6 (for exploratory studies)
Factor Loadings	Indicator/Outer Loading	*Outer Loading* ≥ 0.708 and above (recommended) *Loading* ≥ 0.7. Values of 0.6, 0.5 and 0.4 are sufficient if the other items have high values to complete AVE and CR
Convergent validity	Average Variance Extracted (AVE)	AVE ≥0.5
Discriminant validity	Heterotrait-Monotrait (HTMT)	Uses bootstrapping techniques (90% bootstrapping confidence interval) including -1<HTMT<1 values

Source: Ramayah et al. (2018)

Research Findings

This study utilized descriptive analysis, frequencies, and percentages to profile 229 vocational college lecturers in Pulau Pinang. Table 5 shows the demographic data, including gender, age, race, educational background, and teaching experience, provided context for the findings. The sample comprised 63% female and 37% male participants, with 54% aged 30-39 years. Ethnically, 93% were Malay, 6% Chinese, and 1% Indian. In terms of qualifications, 84% held bachelor's degrees, 15% master's degrees, and 1% a PhD. Teaching experience varied, with 33% having 6-10 years of experience, 27% less than five years, and the rest evenly distributed across brackets from 11-15 years to over 26 years (8%-11%). This demographic diversity provides a comprehensive overview of the vocational lecturers' profiles, aiding in contextualizing and interpreting the study's findings.

Table 5: Distribution Of Respondents Based On Demographics (n=229)

Demography	Information	Frequency	Percentage (%)
Gender	Male	85	37
	Female	144	63
Age	23 to 29 years old	13	6
	30 to 39 years old	123	54
	40 to 49 years old	65	28
	Over 50 years old	28	12
Race	Malay	212	93
	Chinese	14	6
	Indian	3	1
Academic Qualifications	Bachelor's Degree	192	84
	Bachelor (Master)	36	15
	Doctor of Philosophy (PHD)	1	1
Teaching Experience	5 years and below	62	27
	6 to 10 years	75	33

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IJMOE
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	11 to 15 years	28	12
	16 to 20 years	27	12
	21 to 25 years	19	8
	26 years and above	18	8

Transformational Leadership Levels of Directors of Vocational Colleges in Pulau Pinang

Objective 1: Identify The Level Of Transformational Leadership Among Directors Of Vocational Colleges In Pulau Pinang

This section employs mean and standard deviation statistics to describe the perceptions of 229 lecturers regarding the transformational leadership levels of Vocational College Directors in Pulau Pinang. The study examines various dimensions of transformational leadership, including identifying and articulating a vision, fostering the acceptance of group goals, conveying high-performance expectations, providing appropriate models, offering intellectual stimulation, and providing individualized support. Table 6 presents the analysis of these dimensions, highlighting the overall level of transformational leadership exhibited by the Vocational College Directors in Pulau Pinang.

The results show that transformational leadership among Pulau Pinang's Vocational College Directors is generally perceived as high, with an overall mean score of 4.16 (SD=3.83). The highest-rated dimension was the ability to identify and articulate a vision (M=4.36, SD=0.59), suggesting that directors excel in communicating a clear, future-oriented direction for their colleges. However, two dimensions which are high-performance expectations (M=3.99, SD=0.59) and intellectual stimulation (M=3.99, SD=0.69) received relatively lower scores. This suggests that while directors effectively convey the importance of high performance, there may be room for improvement in fostering environments that stimulate innovative thinking. Encouraging more intellectual stimulation could further enhance the colleges' capacity for educational innovation. In summary, Pulau Pinang's Vocational College Directors demonstrate a strong transformational leadership style. They excel in communication, particularly in inspiring teachers and sharing their vision. Despite the overall strong ratings, there is potential for improvement in encouraging creative thinking, which could elevate high-performance standards and promote intellectual stimulation.

Table 6: Analysis of the Level of Transformational Leadership of Directors of Vocational Colleges in Pulau Pinang (n=229)

No	Dimension	M	SD	Level
1	Identifies and articulates a vision (V)	4.36	0.59	Very High
2	Foster the acceptance of group goals (GG)	4.29	0.63	High
3	Conveys high-performance expectations (HPE)	4.15	0.63	High
4	Provide appropriate models (PM)	4.16	0.70	High
5	Provide intellectual stimulation (S)	3.99	0.69	High
6	Provide individualized support (IS)	3.99	0.59	High
	Overall	**4.16**	**0.64**	**High**

Note: Mean= 1.00 to 1.89 (Very Low), Mean= 1.90 to 2.69 (Low), Mean= 2.70 to 3.49 (Medium), Mean= 3.50 to 4.29 (High), Mean= 4.30 to 5.00 (Very High) Source: BPPDP (2006) and Hord (1997)

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Levels of Educational Innovation in Vocational Colleges in Pulau Pinang

Objective 2: Identify The Level Of Educational Innovation Among Lecturers At Vocational Colleges In Pulau Pinang

This analysis examines four variables based on the Stéphan Vincent-Lancrin et al. (2019) questionnaire which are innovation management, resources and drivers, employee motivation and empowerment, and pro-innovation culture. The total mean value for educational innovation is high (M=3.95, SD=0.63). As shown in Table 7, the pro-innovation culture (M=4.03, SD=0.59), resources and drivers (M=3.94, SD=0.73), innovation management (M=3.93, SD=0.55), and employee motivation and empowerment (M=3.90, SD=0.65) all demonstrate high levels. These results, highlighting the high level of instructional innovation among vocational instructors in Pulau Pinang, are presented in Table 7.

Overall, the descriptive findings on instructional innovation among Pulau Pinang's vocational college lecturers are very positive. The most notable element is the pro-innovation culture, which indicates that lecturers are generally enthusiastic and receptive to new concepts and advanced pedagogical approaches. This culture fosters creativity, innovative thinking, and adaptability, all of which enhance students' educational experiences. While lecturers are highly motivated and empowered, there remains room for growth and improvement in this area. Enhancing motivation over time can help lecturers realize their full potential by creating an environment where they feel valued and are more likely to take initiative, assume additional responsibilities, and share their ideas. This ongoing evolution will further strengthen the instructional framework, ensuring that lecturers remain proactive and engaged in their roles.

Table 7: Analysis of the Level of Educational Innovation in Vocational Colleges in Pulau Pinang (n=229)

No	Dimension	M	SD	Level
1	Pro-innovation culture (IC)	4.03	0.59	High
2	Resources and drivers (RD)	3.94	0.73	High
3	Innovation management (IM)	3.93	0.55	High
4	Employee motivation and empowerment (ME)	3.90	0.65	High
	Overall	**3.95**	**0.63**	**High**

Note: Mean= 1.00 to 1.89 (Very Low), Mean= 1.90 to 2.69 (Low), Mean= 2.70 to 3.49 (Medium), Mean= 3.50 to 4.29 (High), Mean= 4.30 to 5.00 (Very High) Source: BPPDP (2006) and Hord (1997)

The Influence of Transformational Leadership on Educational Innovation at Vocational Colleges in Pulau Pinang

Objective 3: Identify The Influence Of Transformational Leadership On Educational Innovation Among Lecturers At Vocational Colleges In Pulau Pinang

Measurement Model

The measurement model presented in Table 8 demonstrates strong psychometric properties for both the Transformational Leadership and Educational Innovation constructs, aligning well with established criteria for reliability and validity. Specifically, the outer loadings for most items exceed the recommended threshold of 0.7 (Hair et al., 2019), with values ranging from 0.842 to 0.916 for Transformational Leadership items and from 0.873 to 0.904 for Educational Innovation items. Notably, while the high-performance expectations (HPE) item shows a lower

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loading of 0.644, this is still acceptable according to Ramayah (2018), who suggests that loadings of 0.6, 0.5, or even 0.4 are sufficient if other items have high values to compensate in the overall AVE and CR calculations. In this case, the high loadings of the other items ensure that both constructs exhibit composite reliability (CR) values well above the 0.7 threshold (Hair et al., 2019), with Transformational Leadership at 0.938 and Educational Innovation at 0.923, indicating excellent internal consistency.

The model also demonstrates strong convergent validity, as evidenced by the Average Variance Extracted (AVE) values. Both constructs surpass the recommended 0.5 threshold (Fornell & Larcker, 1981), with Transformational Leadership achieving an AVE of 0.792 and Educational Innovation at 0.671. These values indicate that the constructs explain a substantial portion of the variance in their respective indicators, further supporting the inclusion of the HPE item despite its lower loading. The high Cronbach's alpha values (0.912 for Transformational Leadership and 0.896 for Educational Innovation) provide additional evidence of the scales' reliability. Overall, these findings suggest that the measurement model is robust and well-suited for further analysis in examining the relationship between transformational leadership and educational innovation, with all items, including HPE, contributing meaningfully to their respective constructs.

Table 8: Measurement model

Construct	Item	Outer Loading	Cronbach's alpha	CR	AVE
Transformational Leadership	Identifies and articulates a vision (V)	0.907	0.912	0.938	0.792
	Foster the acceptance of group goals (GG)	0.916			
	Conveys high-performance expectations (HPE)	0.644			
	Provides appropriate models (PM)	0.879			
	Provide intellectual stimulation (S)	0.842			
	Provides individualized support (IS)	0.890			
Educational innovation	Pro-innovation culture (IC)	0.873	0.896	0.923	0.671
	Employee motivation and empowerment (ME)	0.878			
	Resources and drivers (RD)	0.903			
	Innovation management (IM)	0.904			

Note: Outer Loading > 0.7, CR> 0.7 (Hair et al., 2019), AVE> 0.5 (Fornell & Larcker, 1981)

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The Heterotrait-Monotrait (HTMT) ratio test results, presented in Table 9, provide strong evidence for the discriminant validity among the constructs in this study. All HTMT values fall below the conservative threshold of 0.85, with most well under this limit, indicating a clear distinction between the different constructs measured. Notably, the highest HTMT ratio observed is 0.864 between Vision (V) and Group Goals (GG), which is still acceptably close to the threshold. Other relatively higher ratios include 0.796 between Intellectual Stimulation (S) and GG, and 0.786 between Provides Appropriate Models (PM) and V. However, the majority of the HTMT ratios are significantly lower, many falling below 0.7.

This pattern suggests that while some constructs are naturally related—as expected in a leadership and innovation context—they are sufficiently distinct to be considered separate factors. The consistently low HTMT values, particularly between constructs that are theoretically less related, further support the discriminant validity of the measurement model. Overall, these results indicate that each construct in the study captures a unique aspect of the phenomenon being investigated, providing a solid foundation for further analysis and interpretation of the relationships between transformational leadership components and educational innovation factors.

Table 9: Heterotrait-Monotraite Test (HTMT) Results

	HPE	ME	GG	V	IM	IC	PM	IS	S	RD
HPE										
ME	0.367									
GG	0.502	0.426								
V	0.471	0.448	**0.864**							
IM	**0.325**	0.783	0.408	0.414						
IC	0.454	0.71	0.675	0.685	0.711					
PM	0.444	0.383	0.769	0.786	0.387	0.673				
IS	0.516	0.501	0.788	0.756	0.452	0.695	0.75			
S	0.473	0.484	0.796	0.752	0.494	0.691	0.735	0.824		
RD	0.351	0.721	0.458	0.463	0.725	0.682	0.468	0.469	0.472	

Note: HTMT < 1.00

Note: V= Identifies and articulates a vision, GG= Foster the acceptance of group goals, HPE= Conveys high-performance Expectations, PM= Provides appropriate models, S= Provide intellectual stimulation, IS= Provides individualized support, IC= Pro-innovation culture, ME= Employee motivation and Empowerment, RD= Resources and drivers, IM= Innovation management

Measurement Model

The robustness and significance of the association between Transformational Leadership and Educational Innovation are strongly supported by the model strength analysis shown in Table 10. The Variance Inflation Factor (VIF) for Transformational Leadership is 1.000, indicating the absence of multicollinearity issues and affirming the predictor variable's reliability. The effect size (f^2) of 0.977, which is significantly above the 0.35 criterion for large impacts, is quite remarkable and indicates that Transformational Leadership has a substantial and meaningful influence on Educational Innovation. The coefficient of determination (R^2) value of 0.494 reveals that Transformational Leadership accounts for 49.4% of the variance in Educational Innovation. According to established benchmarks, an R^2 value greater than 0.75 is considered large; thus, this R^2 result falls within the medium to large range, signifying a substantial level of explanatory power within the model. Overall, these measures demonstrate

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EISSN: 2637-0905
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a robust and statistically significant correlation between Transformational Leadership and Educational Innovation, underscoring the critical role that leadership practices play in fostering innovation within educational settings.

Table 10: Model strength

	Educational Innovation		
Construct	**Collinearity evaluation (VIF)**	**Effect size (f^2)**	**Coefficient determination (R^2)**
Transformational leadership	1.000	0.977	0.494

Note: R^2 indicator: R^2=0.25 (weak), R^2=0.50 (medium), R^2= 0.75(large)
Note: Indicator f^2; f^2 =0.35 (large), f^2=0.15 (medium), f^2=0.02 (weak)

The results presented in Table 11 provide strong statistical evidence supporting the hypothesis that Transformational Leadership (TL) positively influences Educational Innovation (EI). The standardized beta coefficient (β) of 0.703 indicates a substantial positive relationship between TL and EI. This relationship is highly significant, as demonstrated by the large t-value of 16.601, which far exceeds the critical threshold of 1.96, and the p-value of 0.001, which is well below the conventional 0.05 significance level. The precision of this estimate is reflected in the relatively small standard error (STDEV) of 0.042. Furthermore, the 95% confidence interval (CI) for the relationship ranges from 0.534 to 0.736, not including zero, which reinforces the statistical significance and robustness of the finding. This narrow CI suggests a high degree of certainty about the true population parameter. The bootstrapping method with a large sample size of 3000 adds to the reliability of these results. Overall, these findings strongly support the hypothesis (Ha1) that Transformational Leadership has a significant and positive impact on Educational Innovation, providing a solid foundation for further discussion and practical implications in the educational leadership context.

Table 11: β Value And Hypothesis Testing

No.	**Relationship**	**Std. Beta**	**STDEV**	**t-value**	**Confidence Interval (BC)**		**P value**	**Results**
					LL	**UL**		
Ha1	TL - > EI	0.703	0.042	16.601	0.534	0.736	0.001	Supported

Note: Bootstrapping method with sample 5000, value p<0.05, t>1.96, LL=Lower Level, UL=Upper Level

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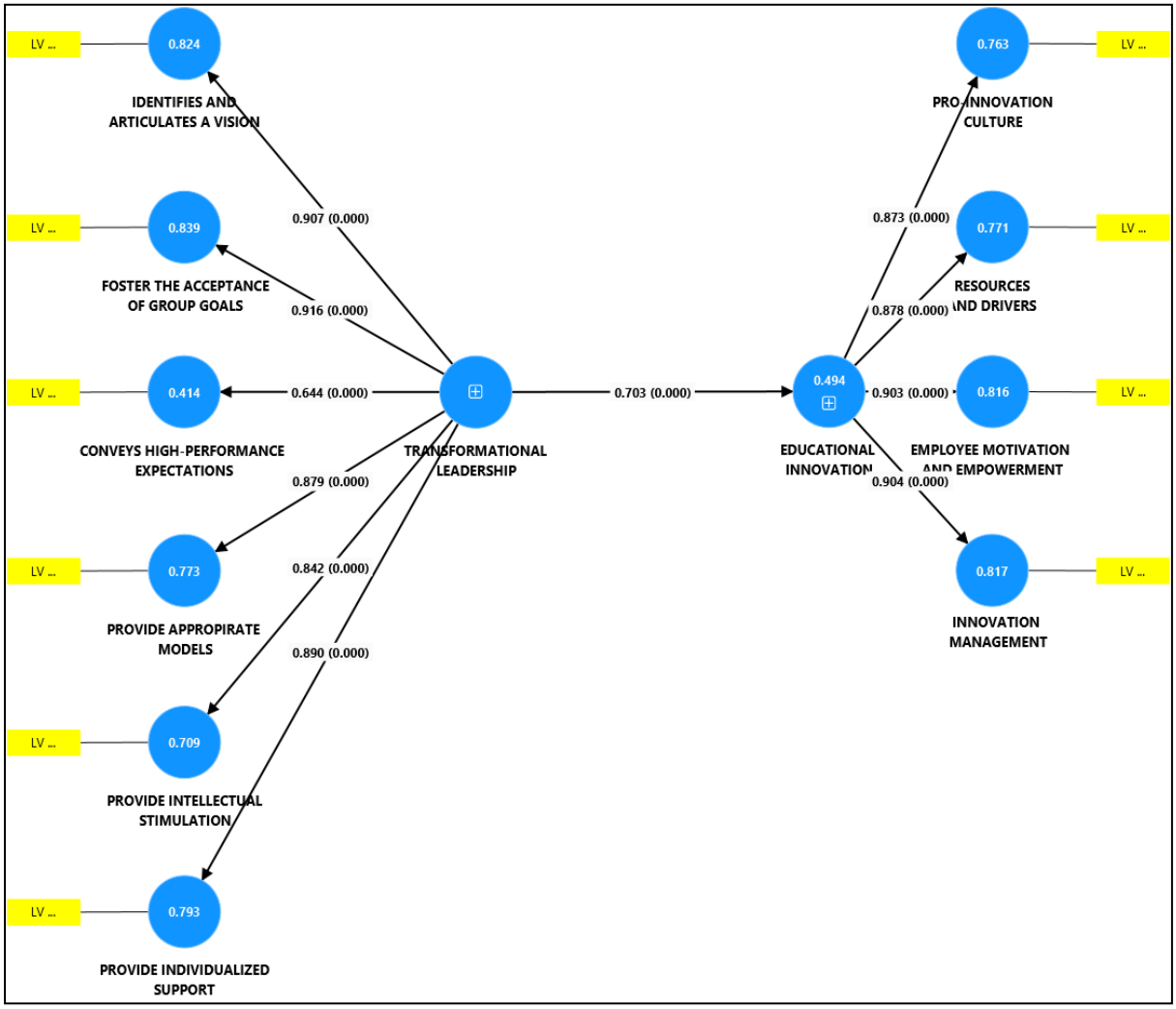

Note: Inner model = Path coefficients (p value), constructs= Rsquare

Figure 2: Structural Model

Summary

This study has successfully fulfilled its objectives, shedding light on the levels of transformational leadership among directors and educational innovation among lecturers in vocational colleges in Pulau Pinang. The directors demonstrated strong transformational leadership capabilities (M = 4.16, SD = 0.64), particularly in articulating a clear vision and fostering group goals (M = 4.36, SD = 0.59). This leadership significantly influenced educational innovation, fostering a pro-innovation culture and effective resource utilization, thereby validating the hypothesis that transformational leadership drives educational innovation.

The results are consistent with the theoretical foundations of the function of leadership in vocational education. As a catalyst for institutional change, transformational leadership integrates educational innovations and encourages creative teaching methods. These findings are consistent with earlier research by Mugo and Kiboss (2023) and Firmansyah et al. (2022), which highlights the beneficial effects of transformative leadership on teacher morale and the calibre of vocational education. Additionally, the study builds on Serdyukov's (2017)

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EISSN: 2637-0905
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Educational Innovation Model by emphasising the vital role that leadership plays in creating an innovative ecosystem through forward-thinking strategies and strong support networks.

From a practical standpoint, the study provides policymakers and educational leaders with achievable suggestions. In keeping with Novitasari's (2020) emphasis on the value of visionary leadership, directors of vocational institutions are urged to place a high priority on intellectual stimulation in order to stimulate creative thinking and improve instructional methodologies. In order to maintain a culture of continual improvement, policymakers should allocate funds for cutting-edge technologies and curriculum development while concentrating on professional development programs that give leaders skills driven by innovation. The results also support Li et al.'s (2023) suggestions to invest in innovative educational resources and encourage creativity.

The high level of educational innovation observed ($M = 3.95$, $SD = 0.63$) underscores the progress being made, though areas such as intellectual stimulation still require improvement. Structural model analysis ($\beta = 0.589$, $t = 8.132$, $p \leq 0.001$) provides robust empirical evidence of transformational leadership's substantial impact on fostering creative instruction and enhancing vocational education. Consistent with the works of Antonopoulou et al. (2021) and Bunjak et al. (2022), these results emphasize the transformative potential of leadership in shaping educational outcomes. Addressing the gap in intellectual stimulation could significantly elevate vocational colleges into high-performing, innovation-driven institutions.

To improve the generalisability of these results, future studies should broaden their geographic focus to include vocational colleges throughout Malaysia. The dynamics of leadership and innovation may be better understood through the use of mixed-method approaches. To evaluate the long-term effects of transformative leadership on student achievement and institutional innovation, longitudinal studies are advised. A comprehensive understanding of the innovation ecosystem in vocational education may be possible by incorporating viewpoints from students, industry stakeholders, and ministry representatives.

This study concludes by highlighting the critical role transformational leadership has in promoting educational innovation in technical and vocational colleges. It offers a strong basis for improving leadership techniques and cultivating a continuous improvement culture in technical and vocational education and training (TVET) systems by filling in current gaps in theory and practice. As previously demonstrated by research like Antonopoulou et al. (2021) and Zahara Tussoleha Rony et al. (2023), the results add to the larger conversation on the transformative potential of leadership in raising the standard of education. This study urges stakeholders to work together to invest in innovation, empower leaders, and establish settings that foster innovation and development in vocational education.

Acknowledgement
The authors would like to extend their sincere gratitude to the School of Education Studies, Universiti Sains Malaysia, for their continuous support and guidance throughout this research. Special thanks to the Bahagian Pendidikan dan Latihan Teknikal Vokasional, Kementerian Pendidikan Malaysia (BPLTV), especially the lecturers in vocational colleges in Pulau Pinang, for their cooperation and invaluable contributions to this study.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 148-164
DOI: 10.35631/IJMOE.724010

References

Al-Husseini, S., El Beltagi, I., & Moizer, J. (2019). Transformational leadership and innovation: The mediating role of knowledge sharing amongst higher education faculty. *International Journal of Leadership in Education, 24*(5), 670–693. https://doi.org/10.1080/13603124.2019.1588381

Almusaed, A., Almssad, A., Yitmen, I., & Homod, R. Z. (2023). Enhancing student engagement: Harnessing "AIED"'s power in hybrid education—A review analysis. *Education Sciences, 13*(7). https://doi.org/10.3390/educsci13070632

Alshammary, F. M., & Alhalafawy, W. S. (2023). Digital platforms and the improvement of learning outcomes: Evidence extracted from meta-analysis. *Sustainability, 15*(2). https://doi.org/10.3390/su15021305

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Routledge. https://www.taylorfrancis.com/books/9781135618896

Bohari, A., Wider, W., Udang, L. N., Jiang, L., Tanucan, J. C. M., & Lajuma, S. (2024). Transformational leadership's role in shaping Education 4.0 within higher education. *Journal of Infrastructure, Policy and Development, 8*(8), 1–21. https://doi.org/10.24294/jipd.v8i8.4900

Bouw, E., Zitter, I., & de Bruijn, E. (2021). Exploring co-construction of learning environments at the boundary of school and work through the lens of vocational practice. *Vocations and Learning, 14(*3), 559–588. https://doi.org/10.1007/s12186-021-09276-2

Criollo-C, S., Moscoso-Zea, O., Guerrero-Arias, A., Jaramillo-Alcazar, A., & Lujan-Mora, S. (2021). Mobile learning as the key to higher education innovation: A systematic mapping. *IEEE Access, 9*, 66462–66476. https://doi.org/10.1109/ACCESS.2021.3076148

Dinc, E. (2019). Prospective teachers' perceptions of barriers to technology integration in education. *Contemporary Educational Technology, 10*(4), 381–398. https://doi.org/10.30935/cet.634187

Dupont, M., & Clercq, P. De. (2024). Assessing the influence of leadership styles on organizational innovation in the technology sector. *International Journal of Economics and Management Sciences, 1*(1), 19–23.

Elrehail, H., Emeagwali, O. L., Alsaad, A., & Alzghoul, A. (2018). The impact of transformational and authentic leadership on innovation in higher education: The contingent role of knowledge sharing. *Telematics and Informatics, 35*(1), 55–67. https://doi.org/10.1016/j.tele.2017.09.018

Firmansyah, A., Chen, M. H., Junaedi, I. W. R., Arwani, M., & Kistyanto, A. (2022). The role of transformational leadership and knowledge management and learning organization on vocational schools performance during digital era. *Frontiers in Psychology, 13*(May), 1–4. https://doi.org/10.3389/fpsyg.2022.895341

Idi, V. J. A., Dan, Z. A., & Kenayathulla, H. B. (2021). Tinjauan kajian empirikal mengenai komuniti pembelajaran profesional di Malaysia (2010–2020): Dapatan dan tema [A review of empirical research on professional learning communities in Malaysia (2010–2020): Findings and themes]. *Geografia-Malaysian Journal of Society and Space, 17*(2), 176–190. http://ejournal.ukm.my/gmjss/article/view/41683

Jabbar, B. F. (2022). Leadership style: Analyzing the influence of transformational leadership on organizational innovation. *Journal of Humanities and Education Development, 4*(3), 172–184. https://doi.org/10.22161/jhed.4.3.21

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 148-164
DOI: 10.35631/IJMOE.724010
Jusuf, Z., Veronika, K., & Sadri, A. (2020). The impact of blended learning on students' performance and satisfaction in South East European University. *South East European Journal of Learning, 7*(2), 45–55.

Koo, H., & Park, C. (2018). Foundation of leadership in Asia: Leader characteristics and leadership styles review and research agenda. *Asia Pacific Journal of Management, 35*(4), 697–718.

Lee, A., Legood, A., Hughes, D., Tian, A. W., Newman, A., & Knight, C. (2019). Leadership, creativity, and innovation: A meta-analytic review. *European Journal of Work and Organizational Psychology, 29*(1), 1–35. https://doi.org/10.1080/1359432X.2019.1661837

Lin, M. (2024). Enhancing digital literacy and technological integration: A case study at Henan's vocational college. *Asian Journal of Research in Education and Social Sciences, 6*(2), 668–680.

Mugo, C. M., & Kiboss, J. (2023). Influence of transformative leadership on quality of vocational training in youth polytechnics within Nakuru County. *International Journal of Business Management, Entrepreneurship and Innovation, 5*(2), 96–118. https://doi.org/10.35942/jbmed.v5i2.326

Nazari, P. N. A., Hussain, N. H. M., & Husin, N. (2024). Transforming performance: The significance of transformational leadership. *E-Jurnal Penyelidikan Dan Inovasi, 11*(2), 177–195.

OECD. (2021). *Measuring innovation in education 2021*. https://www.oecd.org/education/measuring-innovation-in-education-2021.htm

Oliván-Blázquez, B., Aguilar-Latorre, A., Gascón-Santos, S., Gómez-Poyato, M. J., Valero-Errazu, D., Magallón-Botaya, R., Heah, R., & Porroche-Escudero, A. (2022). Comparing the use of flipped classroom with problem-based learning with flipped classroom with case-based learning for improving academic performance and satisfaction. *Journal of Advanced Learning, 18*(3), 310–320.

Sheehan, M., Garavan, T. N., & Morley, M. J. (2020). Transformational leadership and work unit innovation: A dyadic two-wave investigation. *Journal of Business Research, 109*, 399–412. https://doi.org/10.1016/j.jbusres.2019.10.072

Shehaj, A. (2022). Revolutionized learning: Education policy and digital reform in the Eurozone. *European Policy Analysis, 8*(3), 312–326. https://doi.org/10.1002/epa2.1158

Suciani, N. K., Boyce, G. P., Virginiya, P. T., & Sadiyani, N. W. (2023). Student perspectives on the effectiveness of e-portfolio-based digital modules in a hybrid learning environment: A case study in business administration. *Curricula: Journal of Teaching and Learning, 8*(1), 30–39. https://doi.org/10.22216/curricula.v8i1.1647

Ting, I. W. K., Sui, H. J., Kweh, Q. L., & Nawanir, G. (2021). Knowledge management and firm innovative performance with the moderating role of transformational leadership. *Journal of Knowledge Management, 25*(8), 2115–2140. https://doi.org/10.1108/JKM-08-2020-0629

Wan Abdullah, W. A. A., Abdul Razak, K., Hamzah, M. I., & Zhaffar, N. M. (2020). Peranan pentadbir sebagai pencetus penghasilan inovasi dalam kalangan guru inovatif pendidikan Islam. *Journal of Quran Sunnah Education & Special Needs, 4*(1), 11–18. https://jqss.usim.edu.my/index.php/jqss/issue/view/9

Yu, K., & Tsao, H. J. (2024). Research on the challenges and paths of industry education integration in vocational colleges. *International Journal of Education and Humanities, 15*(3), 303–307. https://doi.org/10.54097/vs313783