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Examining Teachers' Views on Innovative Behaviour: A Comparative Study of Gender-Based Differences

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Abstract: As organisations, schools require innovation to persist in a dynamic educational landscape. Innovation stems from the innovative behaviour of schools' members, including teachers, who play a crucial role in the innovation process. Previous studies have identified teacher gender as an influencing factor on innovative behaviour; however, several others have found no correlation between gender and innovative behaviour. Consequently, this study aimed to elucidate the phenomena occurring within the study population. Verifying this, a quantitative study was conducted on 160 high school teachers, comprising 80 male and 80 female teachers in Indonesia. The statistical analysis results indicate that teachers' perceptions of innovative behaviour are high. Furthermore, the findings reveal an insignificant difference in the perceptions of innovative behaviour between both groups. This outcome corroborates that gender is not a determining factor in how teachers perceive innovation in education.

Keywords: Innovative Behaviour, Teachers, Gender Differences, Comparative Study

Introduction

Growth and sustainability are crucial for maintaining organisational competitiveness. In fostering growth, viability, and triumph of organisations, innovation is claimed to play a pivotal role (Khan, 2023). It is because innovation has a transforming effect on almost every facet of an organisation's operations and promotes long-term success. In today's world of rapid change, well-positioned organisations to prosper are the ones that welcome innovation and incorporate it into their strategy, culture, and procedures. Similar to organisations, schools also require the advancements to grow and sustain. Wang and Jin (2023) found that employees' innovative behaviour is a determining factor. Consequently, innovative behaviour is considered crucial for school stakeholders to remain relevant and adaptive in rapidly changing educational environments. As one of the stakeholders who plays a significant role in school improvement, teachers are also deemed to require innovative behaviour. Furthermore, it has emerged as a critical factor in educational development and reform as it plays a vital role in addressing complex challenges and driving positive changes in the education sector. Sumual et al. (2023) indicated that educators are expected to cultivate creative thinking abilities, explore emerging technologies, and advocate innovative ideas to enhance the quality of learning and achieve high educational standards. Notably, the assessment of teacher innovation is context-dependent because subject matter and teaching approaches may influence students' perceptions of teacher innovation. This has been demonstrated during the COVID-19 pandemic, when teachers needed to utilise more diversified teaching methods to facilitate effective student learning (Cao et al., 2022).

According to Thurlings et al. (2015) and Baharuddin et al. (2024), innovative behaviour in teaching is characterised by the generation, creation, development, application, promotion, realisation, and modification of novel ideas to enhance role performance. This concept pertains to the adoption and implementation of new and creative approaches,

methods, and technologies to improve students' learning experiences and outcomes. Janssen (2000), who focused on innovative behaviour at work (IWB), defined it as the intentional improvement, introduction, and implementation of novel ideas within a work role, group, or organisation to enhance its performance. Idea generation, idea promotion, and idea realisation are the three phases of behaviour. Idea generation is the process of coming up with fresh, practical ideas in a variety of fields. These ideas come from issues, contradictions, open-ended difficulties, and developing trends. The process of engaging in social activities to locate allies, sponsors, backers, or coalitions of supporters for one's own ideas is known as idea promotion. Idea realisation, on the other hand, is the process of creating an innovation model or prototype that can be tried out before being implemented individually, in a group, or even throughout the entire organisation (Janssen, 2000).

Teachers' innovative behaviour is crucial for school improvement due to its multifaceted impact on education quality and student outcomes. Li et al. (2024) posited that this behaviour is a vital factor affecting student engagement, addressing diverse needs, promoting critical thinking, fostering lifelong learning, and contributing to educational research and development. Teacher innovation needs encouragement and support to ensure that education remains relevant, effective, and impactful in preparing students for the future. Hashim et al. (2019) added that it plays an important role in maintaining quality education and is essential for the progress of social capital and the country's economy. Interestingly, while teacher innovative behaviour is recognised as crucial, some studies have found the complexity of fostering innovative behaviour among teachers. Overall, teacher innovative behaviour contributes significantly to students' academic achievements, school innovation, and overall education quality (Chen, 2024). It enables teachers to adapt to the evolving demands of contemporary society (Bao, 2024) and is vital for developing young children's innovative literacy and advancing education reform (Mo et al., 2023). Promoting this, schools can enhance teaching effectiveness, support professional development, and ultimately improve the quality of education.

Chen (2024) and Gong and Hasan (2023) posited that innovative behaviour should involve educators actively seeking out and applying novel strategies to improve their instructional practices and engage students more effectively. Furthermore, this behaviour should be characterised by the utilisation of various methods, such as interactive tools, flipped classrooms, project-based learning, and culturally responsive teaching methods (C.G., 2024). These approaches are believed to promote student engagement, motivation, and learning outcomes while fostering creativity, critical thinking, and inclusivity in the classroom. Moreover, utilising innovative pedagogy also emphasises a learner-centred and problem-centred approach, moving away from the traditional teacher-centred model (Zhang et al., 2020). In conclusion, innovative behaviour in teaching is a proactive approach that involves the continuous improvement and adaptation of teaching practices to meet the evolving needs of students and the demands of modern education. Educators must be creative, flexible, and willing to experiment with new ideas and technologies to enhance the overall quality of education.

Menter (2020) discovered that gender diversity has been shown to positively affect university innovation outcomes across teaching, research, and knowledge commercialisation, following an inverted U-shape relationship. This suggests that a balanced gender representation in academia can lead to improved innovative practices. However, the study also found that while female scientists contribute more to teaching and research innovations, male scientists seem better at producing radical innovations for market transfer. Interestingly, research has revealed that there may be a threshold where a minimum level of gender

diversity is necessary to drive augmented innovative behaviour within universities (Menter, 2020). This finding highlights the importance of studying gender dynamics in educational settings to optimise innovative outcomes.

Specifically, teachers are expected to foster a supportive atmosphere that encourages curiosity, active participation, and student autonomy (Cevallos et al., 2024). By implementing innovative development programs and employing diverse teaching strategies, they can contribute to the personal and collective growth of students, helping them adapt to the modern world (Al Mamun, 2024; Zholdasbekova et al., 2024). However, while teacher support was initially expected to significantly affect perceptions of teachers' innovation, this hypothesis was not confirmed, indicating a limited impact of this factor (Zholdasbekova et al., 2024). Furthermore, Nachshoni (2024) emphasised that school principals also play a critical role in improving student outcomes and fostering a conducive learning environment.

Apart from that, gender-based studies can help identify and address potential disparities in innovative behaviour among teachers. For instance, Singh and Sarkar (2012) focused specifically on women primary school teachers in India, examining the relationship between psychological empowerment and innovative behaviour. Such studies can provide insights into the unique challenges and opportunities faced by different gender groups in fostering innovation in education. These studies on teachers' innovative behaviour are crucial for understanding the complex interplay between gender diversity and innovation in educational settings. Furthermore, they can inform policies and practices to create more inclusive and innovative educational environments, ultimately benefiting students and advancing educational research and development (Li et al., 2024; Menter, 2020).

Therefore, this study aims to address a gap in the literature by investigating whether male and female teachers display different attitudes or behaviours towards innovation in the classroom. It seeks to determine the level of teachers' perception on innovative behaviour and to investigate if significant gender-based differences exist in how male and female teachers perceive innovative behaviour in their work settings. The insights from this research are intended to guide the development of targeted interventions and support systems that encourage innovation across genders.

Literature Review

Gender-based studies on teachers' innovative behaviour are important. Therefore, its differences in innovative behaviour have been explored across various fields. For example, a study revealed that junior high school girls outperformed boys in several aspects of creativity (Cheung & Lau, 2010). Additionally, gender diversity on corporate boards has shown a positive influence on research and development (R&D) and patents outcomes (Bustos et al., 2017; Hernández-Lara & Gonzales-Bustos, 2019), underscoring the complex interaction between gender, family dynamics, and innovation in organizations. In academic settings, gender disparities persist, particularly in universities. Men were more likely to be colloquium speakers, even after controlling for gender and rank (Nittrouer et al., 2017). Similarly, during the COVID-19 pandemic, online learning gender disparities mostly favoured men (Idris et al., 2023).

Several studies have also identified significant gender differences among teachers. For instance, Ibrahim (2014) found that students' perceptions of their teachers' behaviour varied significantly by gender. Similarly, Pasha-Zaidi and Afari (2015) reported a notable cross-gender effect on student perceptions of math and science instructors in the United Arab Emirates. These findings suggest that teacher perceptions may differ from student perceptions, complicating gender dynamics in education. Interestingly, the lack of significant

gender differences in teachers' perceptions of innovative behaviour implies that both male and female teachers may share similar attitudes toward innovation in teaching. This similarity could facilitate the implementation of new teaching strategies and the promotion of a creative learning environment. However, it is important to recognise that while perceptions may align, actual practices and outcomes could still vary based on factors like cultural context, subject area, or individual experiences.

Research has provided various insights into teachers' attitudes towards innovation in education, while further studies offer additional perspectives on supporting innovation within educational settings. For example, Kianinezhad (2023) observed that male teachers exhibited a more favourable perspective on online teaching. Issa et al. (2023) identified motivation and collaboration as key factors in fostering innovative practices among teachers, though the study did not explicitly compare genders. It suggested that these factors could influence innovative behaviour differently across genders. Meanwhile, Torrico et al. (2023) explored gender equality policies in university teaching, recognizing the role of feminist teaching practices in shaping how innovation is conceptualized and implemented in educational settings.

However, Gkontelos et al., (2022) found that there are insignificant differences in measuring innovative work behaviour between genders. Schiavio et al. (2022) suggested that music teachers associated creative musicianship with positive concepts, regardless of gender. Moreover, another study by Awaji et al. (2024) found no significant gender differences in the implementation of effective teaching practices. In the context of inclusive education, Mouchritsa et al. (2022) noted that gender influenced positive attitudes towards inclusive education, though the specific nature of this influence was not detailed. Similarly, research by Sang et al. (2009) on teachers' intentions to integrate ICT into teaching found no significant correlation with gender.

From this, it becomes apparent that the contradictory results of research exploring how gender differences affect teachers' views, engagement with, and application of innovative behaviour may lead to gender biases in professional development programs. It could also overlook or fail to address the unique needs of male and female teachers. Without a deeper understanding of these differences, educational institutions may struggle to foster inclusive environments that encourage innovation among all teachers. Moreover, failing to address gender-specific challenges could slow the adoption of essential educational reforms. Understanding gender-based differences in innovative behaviour can therefore inform how teachers are supported in adopting new practices. Schools should consider gender-specific motivations, collaborative styles, and perspectives on equality when promoting innovation. This is supported by Zholdasbekova et al. (2024), who found that teacher innovative behaviour significantly influences students' creativity, motivation, and overall learning experience, which in turn positively impacts students' perceptions of innovation.

Overall, some literature indicates that gender may play a role in shaping approaches to innovation in education, while other comparisons of male and female teachers' innovative behaviour stated gender factor was insignificant. These mixed findings highlight the complexity of gender's role in shaping teachers' attitudes toward innovation, with some studies suggesting differences and others finding no substantial impact.

Methods

This study employed a quantitative survey design. It was guided by Janssen's (2000) unidimensional concept of innovative work behaviour, which is measured through an instrument that delineates the process of innovative behaviour, namely idea generation, idea

promotion, and idea realisation. Before sending the instrument, a pilot test which was completed by 30 respondents who have similar characteristics to the main sample of the study. The purpose of conducting the test was to measure study's instrument's internal consistency. The results indicated a Cronbach's alpha (α) value of 0.90. This demonstrates a high internal consistency and a suitable index (Pallant, 2020). Then, the set of questionnaires to measure teachers' perceptions of the topic was sent and completed by 160 senior high school teachers in Indonesia, comprising 80 male and 80 female teachers.

After that, descriptive and inferential statistics were used to elucidate the findings of this study. Descriptive statistics are to summarize and organize the collected data using measures like averages and percentages. While inferential statistics are to analyse the data to draw conclusions or make predictions about a larger population based on the sample studied. These two types of statistical analyses were used together to explain and interpret the results of the study to help and understand therefore meaningful conclusions can be drawn from it.

Results

Level of Teachers' Innovative Behaviour

Analysis of this part showed that the overall score of teacher's innovative behaviour at a high level (M= 3.71, SD= .79). According to the findings of the analysis, two items showed moderate levels while all other seven showed high levels. The highest value is item number five (M= 3.92, SD= .81) while the lowest is item number seven (M= 3.39, SD= .83).

Table 1
Mean and Standard Deviation (SD) of Teacher's Innovative Behaviour

Item	Mean	SD	Interpretation
Innovative Behaviour 1	3.75	.71	High
Innovative Behaviour 2	3.86	.68	High
Innovative Behaviour 3	3.53	.78	Moderate
Innovative Behaviour 4	3.87	.77	High
Innovative Behaviour 5	3.92	.81	High
Innovative Behaviour 6	3.68	.79	High
Innovative Behaviour 7	3.39	.83	Moderate
Innovative Behaviour 8	3.68	.86	High
Innovative Behaviour 9	3.69	.83	High
Overall	**3.71**	**.79**	**High**

Teachers' Innovative Behaviour Based Perceptions Based on Gender

After checking all the assumptions such as normality, equal variances, and independence, an Independent Samples t-test was conducted to compare the high school teachers' perception on innovative behaviour between male teachers (M= 33.94, SD = 5.58) and female teachers (M= 32.76, SD = 4.94) groups. The assumption of equal variances was tested using Levene's Test, and the results indicated that there is no significant difference in variances between the group of male and female teachers F = .114, p= .74. The t-test results showed that, assuming equal variances, there was no significant difference in their perception on innovative behaviour between male teachers and female teachers groups t (158) = 1.41, p = .08, 95% CI [-.47, 2.82]). Therefore, the results showed that the null hypothesis is failed to be rejected, indicating that there is insufficient evidence to conclude that the mean of teachers' innovative behaviour perception scores differ significantly between the two teachers' groups. These results suggest that the gender differences do not impact on innovative behaviour's perception. The complete results of the analysis can be seen in table 2.

Table 2
Results of an Independent Sample T-Test on Teachers' Perceptions of Innovative Behaviour

Parameter	**Male**		**Female**		***t* (158)**		***p***	***CI* 95%**	
	M	*SD*	*M*	*SD*				LL	UL
Innovative Behaviour	33.94	5.58	32.76	4.54	1.41	.08		-.47	2.82

Discussions

First, descriptive analysis showed that the overall score of teachers' perceptions on innovative behaviour in high schools in Indonesia is high. This is in line with Hashim et al.'s (2019) finding stating that teachers in schools practice high levels of innovative behaviour, namely idea generation, idea promotion, and idea realisation. They further added that the high level of innovative behaviour can enhance the quality of education and contribute to social capital progress and the country's economy. However, Mo et al. (2023) found differently that teacher innovative behaviour is at medium levels. It means that the practice of innovative behaviour can still enhance education quality, social capital progress, and a country's economy at the medium level.

Then, the results of inferential analysis indicate that there is no statistically significant difference between the perceptions of innovative behaviour among male and female high school teachers. This finding contradicts several studies that suggest that gender influences various aspects within the educational context. For instance, female students in junior high school demonstrated superior performance in multiple dimensions of creativity compared to their male counterparts (Cheung & Lau, 2010). Additionally, gender disparities in online learning predominantly favoured males (Idris et al., 2023), and Kianinezhad (2023) observed that male teachers exhibited a more positive attitude towards online teaching. Furthermore, Ibrahim (2014) found that students' perceptions of their teachers' behaviour varied significantly based on gender. Similarly, Pasha-Zaidi and Afari (2015) reported a notable cross-gender effect on student perceptions of mathematics and science teachers.

Several previous studies corroborate the findings of this investigation. Schiavio et al. (2022) posited that music educators associated creative musicianship with positive concepts, irrespective of gender. A study conducted by Awaji et al. (2024) revealed no significant gender disparities in the implementation of effective teaching practices. In the context of inclusive education, Mouchritsa et al. (2022) observed that gender influenced positive attitudes towards inclusive education, although the specific nature of this influence was not elucidated. Similarly, research by Sang et al. (2009) on teachers' intentions to integrate ICT into teaching demonstrated no significant correlation with gender. Notably, Gkontelos et al. (2022) determined that there are insignificant differences in measuring innovative work behaviour between genders. Thus, the finding of this study supports the scholars who found that gender was not a determining factor in how teachers view and approach innovation in education.

This finding challenges stereotypes about gender influencing teaching methods or openness to new pedagogical approaches, suggesting both male and female educators are equally capable of adopting innovative practices. This gender neutrality may stem from standardised teacher training, shared professional development, and a common commitment

to improving educational outcomes. It also reflects the evolving teaching profession, where merit, skills, and adaptability are prioritised over traditional gender roles. Additionally, the finding emphasises the importance of focussing on individual teacher characteristics like experience, subject expertise, and motivation rather than gender when examining factors influencing educational innovation.

Conclusion

Although some studies found that gender influences some areas in education settings, this study found differently. Gender is not a determining factor in how teachers perceive or approach innovation in education, aligning with a body of research that suggests gender does not play a significant role in these areas. Gender-based studies on teachers' innovative behaviour are of significant importance. Such investigations can elucidate potential disparities in the approaches and implementation of innovative practices by male and female teachers in the classroom environment. Understanding these gender-based variations may assist educational institutions in developing targeted strategies to support and foster innovation among all teaching professionals. Furthermore, such research can contribute to addressing any gender disparities in professional development opportunities and recognition for innovative pedagogical methods.

References

Al Mamun, F. (2024). Fostering creativity and critical thinking in the classroom: Strategies for 21st-century education. *International Journal for Multidisciplinary Research*, *6*(4). https://doi.org/10.36948/ijfmr.2024.v06i04.23563

Awaji, B. M., Abdel-Hamid, R. H., Khalil, I. A., & Prahmana, R. C. I. (2024). Mathematics teachers' practices in light of the effective teaching practices. *Infinity Journal*, *14*(1), 1–20. https://doi.org/10.22460/infinity.v14i1.p1-20

Baharuddin, M. F., Masrek, M. N., & Shuhidan, S. M. (2024). Innovative work behaviour of school teachers: A conceptual framework. *IJAEDU- International E-Journal of Advances in Education*, 213–221. https://doi.org/10.18768/ijaedu.593851

Bao, Y. (2024). A dual mediation model of the association between principal inclusive leadership and teacher innovative behaviour. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-63332-0

Cao, C., Zheng, X., Chen, B., Yang, S., Ye, Y., & Yue, X. (2022). Exploring the Impact of Individual and Social Antecedents on Teachers' Teaching Innovation: Perspective of Goal-Oriented Behaviour and Social Identity. *Frontiers in Psychology*, *13*(2630). https://doi.org/10.3389/fpsyg.2022.924052

C.G, M. (2024). Innovations in Teaching Practices. *International Research Journal on Advanced Engineering and Management (IRJAEM)*, *2*(05), 1469–1471. https://doi.org/10.47392/irjaem.2024.0198

Chen, Y. (2024). Teacher Autonomy, Creative Self-efficacy, and Innovative Behaviour: Perspectives from Chinese University EFL Teachers. *Arab World English Journal*, *15*(2), 73–86. https://doi.org/10.24093/awej/vol15no2.5

Cheung, P. C., & Lau, S. (2010). Gender Differences in the Creativity of Hong Kong School Children: Comparison by Using the New Electronic Wallach–Kogan Creativity Tests. *Creativity Research Journal*, *22*(2), 194–199. https://doi.org/10.1080/10400419.2010.481522

Espinosa Cevallos, L. F., Ruiz Peñafiel, V. M., & Bonilla Marchán, A. M. (2024). *Motivation in Education: The Road to Successful Learning* (pp. 23–56).

https://doi.org/10.48190/9789942241849.1

Gkontelos, A., Vaiopoulou, J., & Stamovlasis, D. (2022). Teachers' Innovative Work Behaviour Scale: Psychometric Properties of the Greek Version and Measurement Invariance across Genders. *Social Sciences*. https://doi.org/10.3390/socsci11070306

Gong, L., & Hasan, N. (2023). How can college teachers' information literacy empower their innovative teaching behaviours under the background of informatization? *PLOS ONE*, *18*(12), e0294593. https://doi.org/10.1371/journal.pone.0294593

Gonzales Bustos, J. P., Hernández-Lara, A. B., & Li, X. (2017). Board composition in family and non-family innovative businesses. *Corporate Ownership and Control*, *15*(1–2), 459–466. https://doi.org/10.22495/cocv15i1c2p14

Harris, M., & Johnston, M. A. (2009). *Values-Based Leadership: At the Heart of Sustaining School Reform and Improvement* (pp. 145–158). springer netherlands. https://doi.org/10.1007/978-90-481-3501-1_8

Hashim, N. H., Yaakob, M. F. M., Yusof, M. R., & Ibrahim, M. Y. (2019). Innovative Behaviour among Teachers: Empirical Evidence from High-Performance Schools. In International Journal of Innovative Technology and Exploring Engineering (Vol. 8, Issue 10, pp. 1695–1699). Blue Eyes Intelligence Engineering and Sciences Engineering and Sciences Publication - BEIESP. https://doi.org/10.35940/ijitee.j9015.0881019

Hernández-Lara, A. B., & Gonzales-Bustos, J. P. (2019). The influence of family businesses and women directors on innovation. *Applied Economics*, *52*(1), 36–51. https://doi.org/10.1080/00036846.2019.1638496

Ibrahim, A.-W. (2014). The Students' Perception of Teachers' Classroom Effectiveness on Their Self-Concepts in Lagos Metropolis. *Journal of Teaching and Teacher Education*, *2*(2), 133–141. https://doi.org/10.12785/jtte/020209

Idris, M., Alkhawaja, L., & Ibrahim, H. (2023). Gender disparities among students at Jordanian universities during COVID-19. *International Journal of Educational Development*, *99*, 102776. https://doi.org/10.1016/j.ijedudev.2023.102776

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behaviour. *Journal of Occupational and Organizational Psychology*, *73*(3), 287–302. https://doi.org/10.1348/096317900167038

Kianinezhad, N. (2023). Attitudes towards Online Teaching: Gender, Experience, and Age among Iranian English Language Teaching Teachers. *TESOL and Technology Studies*, *4*(2), 15–26. https://doi.org/10.48185/tts.v4i2.868

Kuril, S., Chand, V. S., & Maun, D. (2023). Measuring teacher innovative behaviour: a validated multidimensional inventory for use with public school teachers. *International Journal of Educational Management*, *37*(2), 393–416. https://doi.org/10.1108/ijem-03-2022-0095

Li, K., Wijaya, T. T., Chen, X., & Harahap, M. S. (2024). Exploring the factors affecting elementary mathematics teachers' innovative behaviour: an integration of social cognitive theory. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-52604-4

Majeed, O., & Omair, S. (2022). Leader Motivating Language as predictor of Innovative Work Behaviour in Higher Education sector of Pakistan. *Research in Educational Administration & Leadership*. https://doi.org/10.30828/real.1063619

Menter, M. (2020). Entrepreneurial universities and innovative behaviour: the impact of gender diversity. *Economics of Innovation and New Technology*, *31*(1–2), 20–34. https://doi.org/10.1080/10438599.2020.1843988

Mo, D., Abdul Kadir, S., Kang, E., & Hassan, R. (2023). The influence of principal inclusive

leadership and teacher efficacy on teachers' innovative behaviour. *International Journal of Academic Research in Progressive Education and Development*, *12*(4), 259–275. https://doi.org/10.6007/ijarped/v12-i4/19657

Mouchritsa, M., Garay, U., Romero, A., & Kazanopoulos, S. (2022). Teachers' Attitudes towards Inclusive Education at Greek Secondary Education Schools. *Education Sciences*, *12*(6), 404. https://doi.org/10.3390/educsci12060404

Nachshoni, A. (2024). The Impact of Principal on Teacher Motivation in Secondary Schools. *International Journal of Science and Management Studies (IJSMS)*, 302–312. https://doi.org/10.51386/25815946/ijsms-v7i2p126

Nittrouer, C. L., Hebl, M. R., Ashburn-Nardo, L., Trump-Steele, R. C. E., Lane, D. M., & Valian, V. (2017). Gender disparities in colloquium speakers at top universities. *Proceedings of the National Academy of Sciences*, *115*(1), 104–108. https://doi.org/10.1073/pnas.1708414115

Pallant, J. (2020). *SPSS survival manual / a step by step guide to data analysis using IBM SPSS*. Routledge.

Pasha-Zaidi, N., & Afari, E. (2015). Gender in STEM Education: An Exploratory Study of Student Perceptions of Math and Science Instructors in the United Arab Emirates. *International Journal of Science and Mathematics Education*, *14*(7), 1215–1231. https://doi.org/10.1007/s10763-015-9656-z

Sang, G., Valcke, M., Braak, J. V., & Tondeur, J. (2009). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviours with educational technology. *Computers & Education*, *54*(1), 103–112. https://doi.org/10.1016/j.compedu.2009.07.010

Schiavio, A., Van Der Schyff, D., Philippe, R. A., & Biasutti, M. (2022). Music teachers' self-reported views of creativity in the context of their work. *Arts and Humanities in Higher Education*, *22*(1), 60–80. https://doi.org/10.1177/14740222221125640

Singh, M., & Sarkar, A. (2012). The Relationship Between Psychological Empowerment and Innovative Behaviour. *Journal of Personnel Psychology*, *11*(3), 127–137. https://doi.org/10.1027/1866-5888/a000065

Sumual, T., Sumual, S., Kalalo, D. K. R., Koessoy, H. M., Setyaningsih, S., & Lolong, R. F. (2023). Innovation Work Behaviour: New Model to Successful Organization. *Romeo Review of Multidisciplinary Education Culture and Pedagogy*, *3*(1), 8–28. https://doi.org/10.55047/romeo.v3i1.933

Thurlings, M., Evers, A., & Vermeulen, M. (2015). Toward a Model of Explaining Teachers' Innovative Behaviour. *Review of Educational Research*, 85, 430 - 471. https://doi.org/10.3102/0034654314557949

Wang, L., & Jin, X. (2023). The Relationship between Participative Leadership and Subordinates' Innovative Behaviour: The Serial Multiple Mediating Effects of Knowledge Sharing and Creativity. *Journal of Industrial Convergence*, *21*(4), 41–63. https://doi.org/10.22678/jic.2023.21.4.041

Zhang, A., Okanazu, O. O., Ibezim, N. E., Sunday, N. H., Obichukwu, P. U., Olelewe, C. J., & Orji, C. T. (2020). Effects of Innovative and Traditional Teaching Methods on Technical College Students' Achievement in Computer Craft Practices. *SAGE Open*, *10*(4), 215824402098298. https://doi.org/10.1177/2158244020982986

Zholdasbekova, K., Zholdasbekov, A., Aidarov, B., Myrzabekov, E., & Zholdasbekova, B. (2024). Role of educators in the creative development of students. *Scientific Herald of Uzhhorod University Series Physics*, *56*, 1273–1283. https://doi.org/10.54919/physics/56.2024.127wg3