

Teachers' autonomy and innovative work behavior: the mediating role of schools' innovation climate

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ABSTRACT

For schools to maintain their competitiveness and enhance the standards of their education, they need to implement innovative approaches that allow them to stay abreast of the constantly changing technological, economic, and social environment. The success of these innovative approaches in schools relies heavily on teachers' innovative work behavior (IWB), and so the role of teachers in this regard is pivotal. It is therefore crucial to determine the factors that affect teachers' IWB. Thus, the purpose of the current study was to investigate the relationship between teachers' autonomy, schools' innovation climate, and IWB. A sample of teachers (n=376) from 12 primary and secondary schools in Kuala Terengganu, Malaysia, were surveyed through a questionnaire that was self-administered. Utilizing structural equation modelling with IBM AMOS version 24, schools' innovation climate was found to have a full mediating role in the relationship between teachers' autonomy and IWB. The findings suggest the important role of innovation climate in linking teachers' autonomy to IWB and therefore have significant implications for school leaders.

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1. INTRODUCTION

As with other organizations, schools face the expectation to constantly innovate in response to the rapidly evolving landscape of education and the world at large. In this regard, teachers assume a pivotal part in guaranteeing that innovation in schools succeeds, since they make up the largest unit in this field and act as the system's main drivers [1]. Teachers' innovative work behavior (IWB), which entails teachers' ability in analyzing opportunities and developing, promoting, and actualizing ideas [2], is seen as essential to the education system's development. Firstly, various things in education have completely changed after the emergence of industrial revolution 4.0 era. For one, perspectives on teaching and learning process have evolved differently from the past [3]. Traditional teaching methods may not effectively meet the needs and expectations of modern learners. But by practicing IWB, teachers can engage students more effectively, enhance their learning outcomes, and prepare them for the challenges of the future [2], [3]. In addition, through innovative practices, teachers stay up to date with advancements in educational technology and pedagogy, creating dynamic learning environments that cater to diverse learning styles and foster creativity and critical thinking skills among students [3], [4]. Furthermore, embracing innovation can help fulfil teachers' personal satisfaction and more importantly lead to their professional growth. It encourages continuous learning, experimentation, and reflection, enabling teachers to refine their practices and remain motivated in their profession [5]. It also allows teachers to collaborate with peers, share best practices, and

contribute to the larger educational community [6]. Lastly, practicing IWB turns teachers into catalysts for positive change within the education system, inspiring colleagues, administrators, and policymakers to embrace innovative practices and promote educational reforms that better serve the needs of students.

Recognizing the paramount importance of innovation, the Malaysian government has in recent years placed a growing emphasis on enhancing the quality of education across the country, with a particular focus on promoting innovation in teaching and learning. To promote IWB among teachers, the Ministry of Education has introduced a noteworthy initiative, the Malaysian Education Blueprint 2013–2025. This blueprint aims to reshape Malaysia's educational system through the enhancement of teaching and learning quality and encouragement for a better approach to education, one that is more innovative and creative. The plan emphasizes the importance of teachers being equipped with the necessary knowledge and skills that enable them to incorporate technology when teaching, as well as encouraging them to collaborate and share ideas and the best practices with their colleagues [7]. The plan also promotes school-based decision making, allowing individual schools to have more autonomy in determining their own policies, programs, and practices. This autonomy enables teachers to have a greater say in shaping the direction of their schools, including decisions related to curriculum, teaching methods, and resource allocation [7].

Despite the government's ongoing efforts to promote innovation in the education system, the level of IWB among Malaysian teachers remains a persistent concern [1]. From studies conducted in recent years, the degree of IWB among teachers in Malaysia has not been exceptional, remaining at low and moderate levels with no significant improvement [8]–[12]. A sustained lack of IWB among teachers can have negative long-term effects on the educational system, both directly and indirectly, including slowed progress, decreased educational quality, stifled creativity, decreased motivation, and detrimental effects on student learning. Therefore, to ensure that the educational system advances and meets the demands of students in a fast-changing world, promoting and supporting IWB among teachers is imperative.

To effectively address this pressing issue, it is pivotal to increase knowledge about the factors determining teachers' IWB. One key factor is the level of teachers' autonomy, defined as the ability to make decisions about work practices and control over teaching methods [13]. Previous studies show a significant relationship between teachers' autonomy and IWB. Teachers having a considerable level of autonomy are more likely to engage in IWB because they have the flexibility to implement new and innovative practices in their classrooms [14]. Autonomy provides teachers with the freedom to adopt new teaching methods, strategies, and techniques without fear of negative consequences [14], [15]. When teachers have control over their work, they can exercise their creativity and use their professional judgment to improve their teaching practices. Previous studies [16], [17] indicated that teachers with perceived job control are more likely to engage in idea generation, and autonomy is positively associated with innovation capacity, including creativity, idea generation, promotion, and readiness to implement new ideas.

However, it must be acknowledged that this relationship may not be exclusively direct, as there are numerous additional factors that can also contribute to the manifestation of IWB [18]–[20]. In light of this, a potential mediating factor that links teachers' autonomy with IWB is schools' innovation climate, defined as "the shared perceptions of organizational members concerning the practices, procedures, and behaviors that promote the generation of new knowledge and practices" [21]. This involves teachers' views on collective readiness to embrace up-to-date practices, adapt to change, and create fresh knowledge, practices, and improvements to achieve organizational goals [22]. Chang *et al.* [23] support of this notion, asserting that schools that foster an environment conducive to innovation, where teachers are open to taking risks and are committed to ongoing learning for organizational improvement, demonstrate greater success in implementing tangible innovations compared to schools with less innovative climates.

Studies indicate that an organizational climate fostering innovation provides a platform for increased autonomy. An innovation-friendly climate, characterized by trust, openness, and risk-taking, allows employees to have greater autonomy in decision-making, idea generation, and problem-solving related to innovation [24]–[26]. However, it is intriguing to note that the relationship between innovation climate and autonomy is not necessarily unidirectional; it can also work in the opposite direction, where autonomy itself contributes to the development of innovation climate. In a study on Chinese nurses, Yan *et al.* [27] found a positive correlation between job autonomy and the perceived innovation climate of organizations. Additionally, the perceived innovation climate acted as a mediator between job autonomy and IWB.

Moreover, prior research has highlighted a noteworthy correlation between the innovation climate and IWB. A positive innovation climate fosters a supportive environment, providing teachers with the necessary resources, support, and motivation to actively engage in IWB [23], [28]–[30]. A conducive school climate that encourages collaboration, positive teacher-student relationships and innovative teaching facilitated IWB among teachers [30]. Supportive innovation environments were identified as catalysts for key elements of IWB, including teacher collaboration, creative classroom techniques, and job satisfaction [31]. Study by Izzati [32] demonstrated that a positive organizational climate, characterized by structure, standards, responsibility, rewards, support, and commitment, positively influences IWB among vocational

high school teachers. Similarly, Balkar [33] found that a positive organizational climate, represented by both support and pressure, influences teachers' IWB in a positive way.

In summary, the literature review reveals that numerous studies have been conducted on the individual links between teachers' autonomy, innovation climate, and IWB. However, there is limited research on the mediating role of schools' innovation climate in the relationship between teachers' autonomy and IWB. Addressing this gap is crucial, necessitating further studies to elucidate the nature of this relationship within a mediation model. Through the examination of this mediating role, this study provides a nuanced perspective to the existing literature and contributes to a more comprehensive understanding of the factors that shape teachers' innovative practices in educational settings.

Figure 1 depicts the conceptual framework of this study, grounded in social cognitive theory [34]. According to social cognitive theory, individuals learn and develop through dynamic interactions between personal characteristics, environment, and behavior [34]. Based on this theory, it is inferred that teachers' autonomy (personal characteristic), innovation climate (environment), and IWB (behavior) are interrelated. Teachers who have greater autonomy and perceive themselves as capable of exercising independence are more likely to engage in IWB. An innovation climate within schools that supports and appreciates autonomy and innovation provides teachers with the necessary resources and support to engage in IWB. Additionally, teachers who observe their colleagues engaging in IWB within a supportive innovation climate have a higher likelihood of being inspired to embrace and demonstrate similar behaviors themselves. Therefore, fostering teachers' autonomy and creating a positive innovation climate can cultivate IWB among teachers.

Derived from the conceptual framework and previous studies, four hypotheses were formulated for the purpose of empirical testing: i) Teachers' autonomy has a significant effect on schools' innovation climate (H1); ii) Schools' innovation climate has a significant effect on IWB (H2); iii) Teachers' autonomy has a significant effect on IWB (H3); and iv) Schools' innovation climate mediates the relationship between teachers' autonomy and IWB (H4).

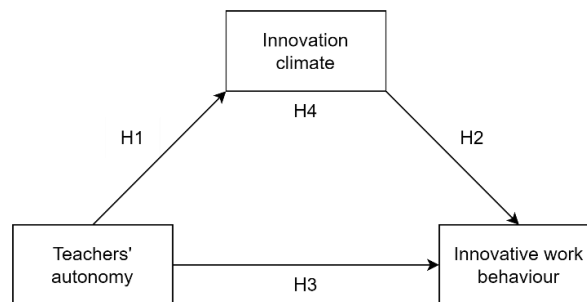


Figure 1. Conceptual framework

2. RESEARCH METHOD

The present study employed a correlational research design, with its goal being to establish the existence of causal relationships between teachers' autonomy, innovation climate and IWB. For data collection, an instrument for use in a survey was developed, in the form of a self-administered questionnaire. To measure teachers' autonomy, the four-item measure developed by Short and Rinehart [13] has been used. Innovation climate was assessed using seven items, adapted from Moolenaar *et al.* [21]. To measure IWB, the 20-item measure developed by Baharuddin *et al.* [35] has been used. All items used a 7-point Likert scale, whereby 1 denotes "Strongly Disagree" and 7 "Strongly Agree". Also included were items on demography. The instrument underwent content validation by nine experts with extensive experience in instrument development and research within the field of educational management. Subsequently, minor modifications were made to the instrument to improve its clarity based on suggestions from experts. Following this, the instrument was pilot tested to determine if there were flaws and to confirm that the questionnaire was well-designed, and respondents understood the questionnaire items. The pilot test was conducted using a sample of 58 teachers from two schools. The reliability values, ranging from 0.74 to 0.933, are considered acceptable and consistent since they all exceed the threshold of 0.70 [36], [37].

The study's population comprises teachers from primary and secondary public schools in Kuala Terengganu, Malaysia. Using Krejcie and Morgan's formula [38], a sample size of 352 was determined sufficient for a population of 4199 teachers. This sample size also satisfies the minimum requirement of 200

cases for SEM analysis to produce reliable results [36]. However, the sample size was increased to 500 to account for potential outliers and unreturned questionnaires. Sampling was done from 12 schools, considering cost, time, and accessibility, using a stratified random sampling technique with proportionate representation. Prior to survey, approval was obtained from the Educational Planning Research Division (EPRD), the State Education Department, and the head teachers of the schools. The survey was carried out in 2022 over two months, yielded 465 returned questionnaires, with 376 deemed useful for analysis.

The majority of respondents in the study were women, constituting 80.1% of the total sample. Among the age groups, the highest number of respondents was those 41 and 50 years old. In terms of education, a small portion of the respondents possessed SPM, STPM, or diploma qualification, while the majority, 84%, held a bachelor's degree. Moreover, 6.6% of the respondents had completed a master's degree. Regarding years of service, approximately half of the respondents had served for more than 21 years, 42% had a service duration between 11 and 20 years, while 7.7% had served for less than 10 years.

3. RESULTS AND DISCUSSION

3.1. Assessment of measurement model

The measurement model was evaluated using a pooled confirmatory factor analysis (CFA). This approach is seen as more efficient and comprehensive than analyzing each construct separately, while also mitigating issues related to model identification, especially when some constructs have fewer than four measuring items [36]. The initial model's fit indices did not meet the required criteria: $\chi^2/df=3.713$ (criteria<3.0), RMSEA=0.085 (criteria<0.08), GFI=0.768 (criteria>0.90), CFI=0.872 (criteria>0.90) and TLI=0.860 (criteria>0.90). To improve the goodness of fit, the model underwent respecification through the removal of the items that had factor loadings less than 0.50 [37]. Modification indices were also examined to identify potential areas of misfit, and items were removed only if they had theoretical justification and modification exceeding 15 [36]. After removing 12 items, all fit measures meet the specified criteria: $\chi^2/df=2.452$, RMSEA .062, GFI=0.905, CFI=0.952, and TLI=0.943.

The convergent validity was assessed by examining three statistical indices: factor loadings, composite reliability (CR) and average variance extracted (AVE). The standardized factor loading estimates for the items came to be between 0.524 and 0.942 as shown in Table 1 and thus surpassed the cut-off value of 0.50. Additionally, all construct's CR and AVE estimates were above 0.70 and 0.50 cut-off values, respectively [37]. This suggests that the measures used for each construct in the study captured a common underlying concept effectively. Therefore, it can be said that convergent validity was achieved.

Table 1. Confirmatory factor analysis

Construct	Item	Factor loading	CR	AVE
Innovative work behavior	OE	0.833	0.890	0.671
	IG	0.880		
	IP	0.737		
	IR	0.819		
Exploration of opportunities	OE3	0.739	0.831	0.621
	OE4	0.813		
	OE5	0.810		
Generation of ideas	IG1	0.714	0.848	0.652
	IG3	0.849		
	IG4	0.852		
Promotion of ideas	IP3	0.842	0.923	0.801
	IP4	0.942		
	IP5	0.898		
Realization of ideas	IR1	0.820	0.869	0.689
	IR2	0.863		
	IR3	0.807		
Teachers' autonomy	AU2	0.524	0.756	0.520
	AU3	0.891		
	AU4	0.700		
Innovation climate	IC2	0.717	0.863	0.613
	IC4	0.846		
	IC5	0.748		
	IC7	0.814		

To test discriminant validity, the square root of each construct's AVE was compared to the correlations between that construct and all other constructs. This assessment aimed to determine the distinctiveness of each construct from the others, thereby quantifying the degree to which they would be conceptually different [36]. In Table 2, the square root of AVE estimates exceeded the correlations between

constructs, indicating a good discriminant validity. For exogenous constructs, the correlation between them was below 0.85 [39], confirming discriminant validity for all constructs in the full model.

For estimation technique in SEM, data normality that is univariate and multivariate is required. For assessment of univariate normality, the observed skewness values were between -0.930 and 0.032, while those of kurtosis were between -0.458 and 1.088. The results indicated that the distribution of data might be normal, following the criteria $\leq |3|$ for skewness and $\leq |10|$ for kurtosis [39]. For assessment of multivariate normality, the Mardia's measure of kurtosis was employed. The Mardia's coefficient was set to be less than $p(p+2)$, where p represented the number of variables that were observed [40]. Since the model employed in this study had 19 observed variables, the threshold was set at 399. The calculated Mardia's coefficient was 110.8, which was below the threshold, indicating that multivariate normality could be assumed.

Table 2. Discriminant validity

	TAU	SIC	IWB
TAU	0.721		
SIC	0.416	0.783	
IWB	0.304	0.733	0.819

3.2. Assessment of structural model

After validating the measurement model, the structural model was developed to specify relationships between constructs. The structural model's goodness-of-fit was similar to that of the earlier CFA measurement model, where the $\chi^2/df=2.452$, RMSEA=0.062, GFI=0.905, CFI=0.952, and TLI=0.943, indicating evidence of adequate fit [36], [37]. The results of structural path analysis are as shown in Table 3. Each path would be deemed statistically significant and supported if the path coefficient exceeded 1.96 and the probability value was below 0.05 [36]. H1, which posited that teachers' autonomy has a significant effect on schools' innovation climate, was supported ($\beta=0.416$). H2, which predicted that schools' innovation climate has a significant impact on IWB, was also supported ($\beta=0.733$). However, H3, which predicted that teachers' autonomy has a significant effect on IWB, was not supported.

Table 3. Result of hypothesis testing

	Path	Std. beta	p-value	Decision
H1:	TAU --> SIC	0.416	0.000	Supported
H2:	SIC --> IWB	0.733	0.000	Supported
H3:	TAU --> IWB	0.001	0.985	Not supported

H4 was tested following the steps recommended by Awang *et al.* [36]. As shown in Figure 2, standardized estimates for paths p1 and p2 yielded statistically significant results, signifying a mediation effect. Notably, the direct effect p3 did not reach the significant level, suggesting that full mediation had occurred. These outcomes aligned with the criteria for mediation [36]: the multiplication of paths p1 and p2 resulted in a value greater than path p3, which was not significant. This confirmed the presence of full mediation, and thus supporting H4.

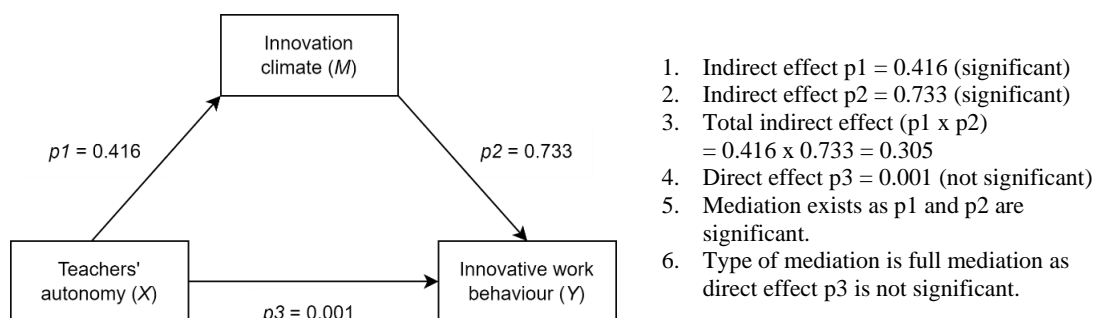


Figure 2. The results of testing the mediating effect

The coefficient of determination, denoted as R^2 , assesses the goodness of fit of a regression model by quantifying how much of the variation in the dependent variable explained by the independent variable(s) [36], [37]. According to Hair *et al.*'s rule of thumb [41], R^2 values of 0.75 are substantial, 0.50 moderate, and 0.25 weak. The model suggests that a moderate proportion of 54% of IWB can be predicted by a combination of teachers' autonomy and perceived innovation climate. However, the predictive power of teachers' autonomy for perceived innovation climate is classified as weak, accounting for only 17%.

3.3. Discussion

This study addressed the important role of teachers' autonomy in influencing how teachers perceive schools' innovation climate, and how the perceptions subsequently influence their IWB. The findings established that granting teachers with autonomy shapes their perceptions of innovation climate, which implies that as the level of autonomy increases, their perceptions of overall innovation climate within schools also improves. In other words, when teachers feel empowered and trusted to make decisions, it creates a positive climate that encourages collaboration, creativity, and risk-taking. This finding highlights the importance of providing teachers with a sense of independence and control in their work, as it positively impacts their perception of the school's environment for fostering innovation.

Also demonstrated by the findings was that innovation climate has a meaningful positive effect on innovative work behavior, implying the importance of establishing an innovation-supportive climate within schools to stimulate and enhance teachers' IWB. A positive innovation climate encourages teachers to take risks, explore new ideas, collaborate with colleagues, and actively seek opportunities for improvement and growth [23], [25], [29]–[33]. By creating a supportive and encouraging atmosphere that values and promotes innovation, schools can effectively cultivate a culture of continuous learning and development, resulting in increased instances of IWB among teachers. Furthermore, it was discovered that schools' innovation climate fully mediates the relationship between teachers' autonomy and IWB. This finding implies that the effect of autonomy on IWB is entirely dependent on the innovation climate within schools. In other words, autonomy alone does not directly impact IWB; instead, it exerts its effect through the intermediary factor of the innovation climate. In such cases, even though teachers have autonomy, the absence of a supportive environment may inhibit the translation of autonomy into IWB. Conversely, a positive innovation climate within schools can compensate for a lack of autonomy by providing teachers the necessary support and resources to engage in IWB.

Overall, while previous studies suggested a direct link between teachers' autonomy and innovative work behavior [14]–[17], this study underscores the crucial role of the innovation climate in transmitting the effects of teachers' autonomy on IWB. This positive climate creates a psychological safety net, motivating and empowering teachers to engage in IWB. These findings align with Yan *et al.*'s results [27] in survey of Chinese nurses, indicating that the perceived organizational innovation climate acts as a mediator between job autonomy and IWB. Higher job autonomy enables employees to exert control over their work, providing increased access to organizational resources and support for fostering IWB.

The results of this study have significant ramifications for school leaders as well as educational policymakers. Granting autonomy is typically considered an effective mechanism in stimulating IWB; however, our study suggest that autonomy alone may not be enough to fully drive IWB among teachers. Even if teachers have high levels of autonomy, their perception of innovation climate plays a critical role in facilitating or inhibiting their innovative actions. Therefore, school leaders and policymakers should focus not only on granting autonomy to teachers but also on creating an environment that supports and encourages innovation. To foster IWB among teachers, the following administrative practices are recommended:

- i) Prioritize on creating and nurturing a positive innovation climate by establishing a supportive, collaborative environment that encourages innovation, risk-taking, and continuous improvement. By providing resources, recognition, and opportunities for professional growth, leaders can inspire and motivate teachers to embrace their autonomy and engage in innovative practices.
- ii) Acknowledge teachers' innovative work through various means, such as verbal appreciation, public recognition, or incentives. Establish a system of rewards and incentives that recognize and celebrate innovative practices to further motivate teachers to continue their innovative work.
- iii) Encourage collaborations and open communication channels among teachers. By facilitating opportunities for teachers to share ideas, collaborate on projects, and learn from one another, leaders can foster a culture of collective innovation. This can be achieved through regular team meetings, professional learning communities, and platforms for sharing the best practices and innovative ideas.
- iv) Create an environment that supports risk-taking and learning from failure. Innovation involves experimentation, and not all innovative attempts will succeed. School leaders should emphasize that failures are opportunities for growth and encourage teachers to take calculated risks in their pursuit of innovative practices. By promoting a growth mindset and providing support during challenging times, school leaders can create a culture that embraces innovation even in the face of setbacks.

4. CONCLUSION

In this study, an investigation was carried out on the relationship between teachers' autonomy, schools' innovation climate, and teachers' IWB. Schools' innovation climate was found to fully mediate the relationship between teachers' autonomy and IWB. This suggests that the presence of a positive innovation climate is crucial in ensuring that teachers' autonomy translates into actual innovative practices. When schools have a positive innovation climate that supports experimentation, risk-taking, and creativity, teachers are more likely to feel encouraged to try new approaches and methods in their teaching. This can lead to more effective and engaging teaching practices. Understanding these relationships can help education policymakers and school leaders create policies and environments that support and encourage innovation among teachers, ultimately improving the quality of education.

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