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From HRM practices to AI-enabled innovation: The mediating role of teachers' AI readiness

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Abstract

The rapid digital transformation of education and the growing integration of artificial intelligence in schools create new demands for teachers' skills and innovation. This paper aims to examine the impact of strategic human resource management practices on teachers' innovative work behaviour by analysing the mediating role of artificial intelligence readiness and the moderating role of growth mindset. Survey data were collected from 218 teachers working in Kazakhstani schools. The findings show that artificial intelligence readiness partially mediates the relationship between perceived human resource management practices and teachers' innovative work behaviour, indicating that human resource management systems support innovation partly by developing teachers' artificial intelligence -related capabilities. Growth mindset was also found to have a positive direct relationship with innovative work behaviour. However, it did not significantly moderate the relationship between artificial intelligence readiness and innovative work. These outcomes suggest that technology investments in schools should be supplemented by human resource management and professional development practices that improve teachers' capabilities and opportunities to engage with artificial intelligence.

Keywords: Artificial intelligence readiness; Growth mindset; Innovative work behavior; Strategic human resource management

1. Introduction

In today's rapidly evolving knowledge economy, innovation is closely associated with organizations' capacity to adapt to change and sustain organizational performance (Kontoghiorghes et al., 2005). This concern is equally relevant to schools, where innovation may involve changes in curriculum, teaching, assessment, technology use, and relationships with parents and communities in response to changing learner and societal needs (Serdyukov, 2017). Yet schools may struggle to implement and sustain innovation because established routines, accountability demands, resource conditions, and the uncertainty associated with change can constrain experimentation and implementation (Serdyukov, 2017). Because innovation is ultimately enacted by employees, an organization's capacity to innovate also depends partly on how human resource management [HRM] practices develop employees' abilities, motivation, and opportunities to contribute to innovative activity (Bos-Nehles et al., 2017). In schools, HRM practices can similarly support teachers' involvement, empowerment, motivation, and professional development (Runhaar, 2017), while professional development, self-efficacy, supportive leadership, and school climate have been associated with stronger teacher competences and innovativeness (Aydemir Altaş & Babacan, 2025; Hidayat & Patras, 2024). Together, these conditions provide an important organizational basis for teachers' innovative work behaviour [IWB].

Although innovative work behaviour [IWB] has attracted growing research attention, how individual and organizational antecedents combine to shape teachers' innovative behaviour in school settings remains incompletely specified, despite evidence pointing to factors such as self-efficacy, transformational leadership, and school climate (Hidayat & Patras, 2024; Huang et al., 2026). At the same time, teachers in many educational contexts are increasingly expected to integrate digital tools and AI into everyday instruction while adapting their teaching to the needs of diverse learners (OECD, 2025). Within Central Asia, regional digitalisation efforts increasingly emphasize accessible digital learning ecosystems (UNICEF Regional Office for Europe and Central

Asia, 2023), while Kazakhstan provides a particularly relevant example through the expansion of personalized digital learning, AI-enabled educational applications, and digital public goods (Nazyrova et al., 2025; UNICEF, 2024). At the same time, the digital transformation of education has raised governance concerns related to educational data, digital infrastructure, ethical governance, and dependence on external platforms (Pınar, 2026; Simiyu et al., 2026). Evidence on AI integration further suggests that effective implementation depends on interacting teacher-level and organizational conditions. Teachers' AI literacy, readiness, and technopedagogical competence are important for meaningful adoption and integration (Çakır & Güner, 2026; Ding et al., 2024; Pratiwi et al., 2025; Yue et al., 2024), while supportive infrastructure, HRM practices, transformational leadership, school climate, and access to resources, time, and peer support can create conditions in which teachers are better able to experiment with and adopt new practices (Gârdan et al., 2025; Hidayat & Patras, 2024).

A growing body of research has examined teachers' AI readiness, which has been conceptualized as a multidimensional state of preparedness encompassing cognition, ability, vision, and ethical considerations regarding the educational use of AI (Wang et al., 2023). Teachers may simultaneously recognise AI's potential to improve efficiency and support teaching while reporting limitations related to knowledge and confidence, ethical concerns, access to appropriate resources, and institutional support (Granström & Oppi, 2025). Moreover, although teachers may report relatively strong technological-pedagogical competence and self-efficacy, their intention to adopt AI can remain moderate (Ismaniati et al., 2025). Research on technology and AI adoption has frequently been informed by the Technology Acceptance Model and related acceptance constructs, although these approaches may not fully capture the cognitive, affective, pedagogical, and contextual dimensions involved in teachers' AI integration (Davis, 1989; Tusyanah et al., 2026). Although organizational support and the HRM implications of AI adoption are beginning to receive attention, comparatively little is known about how specific school-level HRM practices shape teachers' AI readiness and translate that readiness into workplace behaviour (Gârdan et al., 2025; Granström & Oppi, 2025). The literature on teachers' innovative work behaviour [IWB] has similarly identified both individual and organizational antecedents. Teacher IWB encompasses the generation and implementation of useful new ideas, and empirical evidence suggests that learning-organization conditions, work engagement, self-efficacy, transformational leadership, and school climate can contribute to teachers' innovativeness (Hidayat & Patras, 2024; Hosseini & Haghighi Shirazi, 2021). Importantly, emerging evidence has begun to connect the two strands of literature. Teachers' AI readiness has been associated with AI-enhanced innovation (Wang et al., 2023), while recent studies have linked AI readiness with innovative AI-integrated lesson design and, in university settings, with broader IWB (Fu & Yan, 2026; Tusyanah et al., 2026). Nevertheless, these research streams have only recently begun to converge. It therefore remains insufficiently understood whether AI readiness is associated with the established IWB construct among teachers working in school settings and, particularly, whether school-level HRM practices strengthen or weaken this relationship.

The picture is further informed by psychological perspectives on individual attitudes. According to growth mindset theory, individuals who believe that human potential is malleable are more likely to embrace challenges, persist in the face of setbacks, and view effort as an opportunity for learning (Dweck et al., 1995). Recent research further suggests that a growth-oriented view of human potential may encourage more positive responses to intelligent technologies, including robots and artificial intelligence, by reducing perceived threat and increasing readiness to engage with such technologies (Dang & Liu, 2022). These findings suggest that teachers' growth mindset may serve as an important boundary condition in AI-related transformation processes.

When teachers see their cognitive capacities as improvable, they are more inclined to view AI as an opportunity to strengthen their professional practice rather than as a threat to their professional identity.

Based on this, several research gaps have been identified in the literature. First, studies on the

HRM–innovation link have paid relatively limited research attention to AI readiness and rarely consider HRM systems as antecedents, typically framing readiness as an individual disposition shaped by technology characteristics. Second, more research needs to be done to explore the moderating role of growth mindset in relation to AI-related concepts, especially in schools where AI adoption is actively unfolding. Third, HRM–innovation research has devoted limited attention to schools, and even less to teachers working in post-Soviet education systems. Accordingly, we still lack an integrated model that links strategic HRM practices, AI readiness, growth mindset, and teachers' IWB within a single research model.

Our paper addresses these gaps by analysing how teachers' perceptions of HRM practices relate to their IWB via AI readiness, and whether this relationship is strengthened by their growth mindset.

We conceptualize HRM practices through the Ability–Motivation–Opportunity [AMO] lens, distinguishing ability-, motivation-, and opportunity-enhancing practices at the school level (Bos-Nehles et al., 2023). Rather than being distinct latent constructs, these three dimensions are viewed as complementary parts of an overarching HRM system. Ability-enhancing practices develop teachers' knowledge and skills, motivation-enhancing practices encourage effort and involvement, and opportunity-enhancing practices provide support and opportunities to apply skills. Together, these practices may foster organisational conditions that enhance teachers' readiness to engage with AI. We have treated AI readiness as a teacher-level latent construct capturing confidence, skills, and perceived usefulness of AI for educational purposes (Wang et al., 2023).

Growth mindset is defined as teachers' beliefs about the malleability of human cognitive abilities (Dang & Liu, 2022; Dweck et al., 1995). The study focuses on schools in Kazakhstan as a representative Central Asian context undergoing rapid digital and curricular reforms.

We address three research questions: (1) How do perceived strategic HRM practices influence teachers' AI readiness? (2) Does AI readiness mediate the relationship between strategic HRM practices and teachers' innovative work behaviour? (3) Does teachers' growth mindset strengthen the relationship between AI readiness and IWB?

Our work contributes to a better understanding of the mediating mechanisms between HRM practices and IWB, examines growth mindset as a potential psychological boundary condition for AI-driven innovation in education, and extends HRM–innovation research into the educational sector. It shows how school HRM practices, viewed through the AMO framework and the Job Demands–Resources [JD–R] model, function as job resources that build teachers' AI readiness and growth mindset as personal resources, which in turn shape their IWB in the classroom.

1.1. Kazakhstani School Context

Number of studies indicate that Kazakhstan's educational system is highly centralised, characterised by comprehensive national standards and a strong top-down approach to curricula, assessment, and accountability (OECD, 2018; Yakavets et al., 2023). To strengthen critical thinking, teamwork, and the country's international competitiveness, recent reforms, most notably the Renewed Content of Education [RCE], have introduced a skills-focused curriculum, criterion-based assessment, and learner-centred pedagogies (Ministry of Education and Science of the Republic of Kazakhstan [MoES], 2016; Yakavets et al., 2023).

Teachers are expected to adapt to new roles within a still highly bureaucratic system, drawing attention to tensions between ambitious policy goals and classroom realities (Yakavets et al., 2023). To make teaching more attractive and support the implementation of reforms across both urban and rural schools, the Law on the Status of Teachers (2019) aims to reduce workload, improve remuneration, and expand opportunities for professional development (Republic of Kazakhstan, 2019; Sarmurzin, 2024).

2. Literature Review and Hypotheses Development

Currently, innovation at work is viewed by HRM scholars as a discretionary work behaviour that should be facilitated by organisations, rather than relying solely on individual effort (Bos-Nehles et

al., 2017; Prieto & Pérez-Santana, 2014). One such approach is the Ability-Motivation-Opportunity [AMO] framework, which identifies three distinct pathways through which managers can influence desired employee behaviours and views HRM practices as bundles rather than as isolated policies (Bos-Nehles et al., 2023). Previous studies suggest that bundles of HRM practices, such as high-involvement or high-performance work systems, can jointly enhance employees' skills and work effort and create favourable conditions for pro-organizational behaviour (Bhatti et al., 2021; Prieto & Pérez-Santana, 2014). In the educational context, this logic is particularly important for improving teachers' performance because teaching is knowledge-intensive and context-dependent. HR practices can therefore support how teachers respond to new instructional demands and engage with change (Van Beurden et al., 2025). Accordingly, drawing on the previous research discussed above, our work develops a research model linking school HRM practices to teachers' innovation-related outcomes while also incorporating individual differences as boundary conditions.

2.1. HRM Practices and AI Readiness

According to Bos-Nehles et al. (2023), the AMO framework explains work outcomes as a function of employees' ability, motivation, and opportunity, with various HRM practices contributing to the development of these three conditions. In school settings, teachers' perceptions of HR practices can be categorized into AMO bundles, including ability-enhancing practices such as coaching and career development, motivation-enhancing practices such as performance management, and opportunity-enhancing practices such as communication and information sharing (Van Beurden et al., 2025). The same authors further revealed that this conceptualisation views HRM as a set of resources that can support teachers' development and work through bundled practices rather than isolated interventions. Similar reasoning can be applied to career self-efficacy research, where personal, educational, and contextual resources contribute to the development of efficacy beliefs and subsequent developmental outcomes, while contextual support may interact with individual resources in shaping such beliefs (Gassanova, 2026; Zhou & Wang, 2025). Related evidence from teacher education further suggests that technology self-efficacy can contribute to AI readiness and, through readiness, to AI-integrated pedagogical practice (Tusyanah et al., 2026). Teacher AI readiness can be conceptualized as a state of preparedness encompassing cognition, ability, vision, and ethical considerations regarding the educational use of AI (Wang et al., 2023). Within K–12-focused models of readiness and intention, readiness has also been operationalized in terms of teachers' preparedness to teach AI, while confidence in teaching AI has been treated as a related but distinct construct associated with both readiness and behavioural intention (Ayanwale et al., 2022).

In this study, we focus specifically on the capability-oriented aspect of AI readiness, referring to teachers' confidence, knowledge, skills and perceived capability to engage with AI in educational practice. These elements are treated as reflective indicators of an underlying state of preparedness rather than as separate dimensions.

Our general expectation is that stronger HRM systems should be associated with greater teacher AI readiness, as HRM bundles can develop the right competencies, support employees' efforts, and provide opportunities to apply these competencies in practice (Bos-Nehles et al., 2023; Van Beurden et al., 2025). This capability-building logic is also consistent with calls for training and support that can improve teachers' readiness to integrate AI technologies into their teaching practice (Ayanwale et al., 2022). Based on this reasoning, we propose the first hypothesis:

Hypothesis 1: HRM has a positive impact on teachers' AI readiness.

2.2. AI Readiness and Innovative Work Behaviour

Employees' IWB is widely conceptualised as intentional behaviour through which individuals generate, introduce, and apply new ideas to improve their work performance, which in turn affects the organizational performance (Bos-Nehles et al., 2017). In addition, IWB can be described as "everyday innovation," involving employees' intentional efforts to generate and

apply useful new ideas in the workplace (Prieto & Pérez-Santana, 2014). From an organisational perspective, innovation at work depends on employees having both the ability and the motivation to engage in change-oriented behaviour beyond their formal roles (Bos-Nehles et al., 2017). Teacher AI readiness refers to teachers' AI-related knowledge and competence for educational practice (Ayanwale et al., 2022; Wang et al., 2023) and can be considered an important ability for innovation.

Previous research indicates that the components of teachers' AI readiness positively predict AI-enhanced innovation, suggesting that greater preparedness may enable teachers to translate AI-related knowledge and capabilities into innovative educational practices (Wang et al., 2023). Emerging evidence from teacher education similarly shows that AI readiness is positively associated with AI-integrated innovative lesson design, further linking preparedness for AI with pedagogical innovation (Tusyanah et al., 2026). This relationship is theoretically consistent with conceptualisations of innovative work behaviour [IWB], which extend beyond idea generation to the promotion, realization, and implementation of beneficial new ideas in the workplace (Bos-Nehles et al., 2017). In educational settings specifically, innovative behaviour likewise involves the generation, realization, and sustained implementation of new ideas in professional practice (Lambriex-Schmitz et al., 2020). Evidence from K–12 teachers further shows that AI readiness positively predicts behavioural intention to teach AI, while confidence in teaching AI is positively associated with such intention (Ayanwale et al., 2022). More recent evidence also indicates a positive association between AI readiness and broader IWB among university teachers, although this relationship has so far been examined outside the school context and using cross-sectional data (Fu & Yan, 2026). Taken together, these findings suggest that teachers who are better prepared cognitively, practically, and ethically to work with AI should be more likely to translate technological possibilities into the generation and implementation of innovative ideas in their professional practice. Hence, we propose the following hypothesis:

Hypothesis 2: AI readiness has a positive impact on teachers' innovative work behaviour.

2.3. Mediating Role of AI Readiness

Previous research revealed that HR practice bundles can promote IWB via mediating mechanisms such as management and coworker support, suggesting an indirect path from HRM to innovation (Prieto & Pérez-Santana, 2014). In educational settings, HR practices can impact teacher performance indirectly through work engagement, highlighting the role of mediating factors (Van Beurden et al., 2025). At the same time, teacher AI readiness is also positively related to innovation outcomes, as its different components predict AI-enhanced innovation (Wang et al., 2023). Taken together, HRM practices in schools may enhance teachers' AI readiness, which in turn supports greater IWB. Thus, we propose:

Hypothesis 3: AI readiness mediates the relationship between HRM and innovative work behaviour.

2.4. Growth Mindset as Moderator

In our study, we argue that growth mindset can strengthen the relationship between AI readiness and IWB. Previous research shows that growth mindset is positively related to innovative behaviour (Liu & Tong, 2022) suggesting that learning-oriented beliefs can support innovation. The same scholars further suggest that individuals with a stronger growth mindset are more likely to persist, learn, and use their abilities when facing new or challenging demands. This persistence mechanism is particularly relevant to AI-enabled work, as AI readiness reflects teachers' preparedness in terms of knowledge, competence, and judgement, which may require continuous learning to be applied in practice (Wang et al., 2023).

In education-related digital contexts, recent research confirms that growth mindset can act as a boundary condition in capability-based models involving technology-related knowledge and competency outcomes (Su et al., 2025). This suggests that growth mindset may influence how technological capabilities translate into higher-level outcomes. Since AI readiness represents a capability-related state and IWB reflects behavioural enactment, the relationship between AI

readiness and IWB should be stronger when teachers have a stronger growth mindset. Thus, we propose the following:

Hypothesis 4: Growth mindset strengthens the positive relationship between AI readiness and innovative work behaviour.

2.5. Conditional Indirect Effect

The empirical evidence suggests that the indirect effects of HR practices on innovation may vary according to individual orientations. Namely, HR training was linked to IWB partly through proactivity, while learning goal orientation strengthened this relationship (Odoardi et al., 2022). This evidence indicates that HRM-driven capabilities may translate into innovation more strongly when individuals have higher learning-oriented beliefs. Another study showed that HR practice can influence IWB through intermediate conditions, supporting the indirect effect of HRM on innovation outcomes (Prieto & Pérez-Santana, 2014).

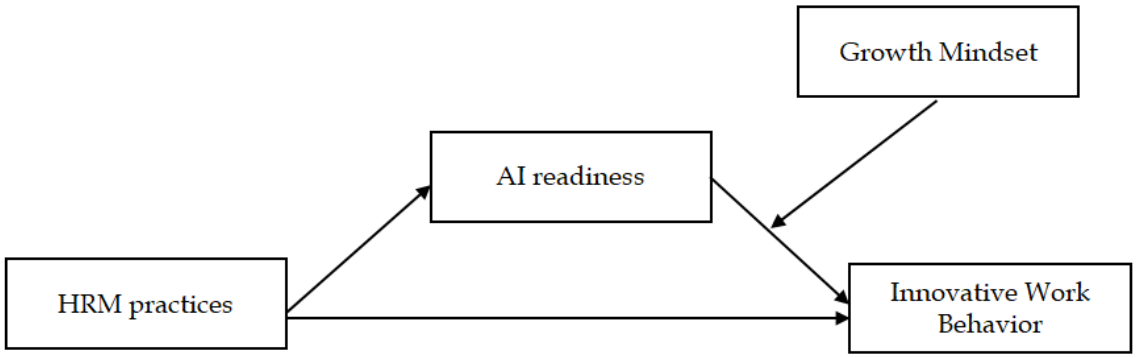
Teacher AI readiness positively predicts AI-enhanced innovation, while a growth mindset can help translate this preparedness into innovative behaviour (Liu & Tong, 2022; Wang et al., 2023). Growth mindset can act as a boundary condition in technology-related capability pathways (Su et al., 2025). Thus, growth mindset may strengthen the indirect relationship between HRM practices and IWB through AI readiness (Fig 1). Thus, the following hypothesis was proposed:

Hypothesis 5: The indirect effect of HRM on innovative work behaviour via AI readiness is stronger when growth mindset is higher.

The proposed relationships between HRM practices, AI readiness, growth mindset, and IWB are presented in Figure 1.

Figure 1

Conceptual framework



3. Method

3.1. Research Design

This study employed a quantitative cross-sectional research design using survey data from school teachers in Kazakhstan. The design was used to examine the direct, mediating, and moderating relationships proposed in the conceptual model. Data were analysed using PLS-SEM.

3.2. Sampling and Data Collection

The study population comprised teachers employed in Kazakhstani schools who were currently teaching at the primary, lower-secondary or upper-secondary level. School leaders and professional networks were asked to distribute an invitation with a link to an online questionnaire. Participation was voluntary and anonymous. In total, 249 teachers completed the questionnaire; after excluding cases with substantial missing data on the focal variables, 218 responses were retained for analysis. Because the survey link was disseminated through multiple channels, it was not possible to calculate a precise response rate.

The study received ethical approval from the authors' institutional research ethics committee. Before starting the questionnaire, participants read an information sheet describing the purpose of

the study, confidentiality arrangements and their rights, and indicated informed consent electronically.

Among the teachers in the analytic sample, around 83% were female, 12% male, and 5% preferred not to disclose their gender. In terms of age, approximately 29% were 50–59 years old, 28% were 30–39, 26% were 40–49, 9% were 20–29, 7% were 60–69, and about 1% were 69 years or older. Teaching experience was generally high: 47% reported 20 or more years of experience, 27% had 10–19 years, 16% had 4–9 years, 8% had 1–3 years, and only 1% had less than one year. Tenure in the current school showed a similar pattern, with 49% having worked in the same school for 10 years or more, 31% for 4–9 years, 19% for 1–3 years, and 1% for less than a year.

Most teachers held at least a bachelor's degree: about 81% had a bachelor's degree, 9% a master's degree, 10% an associate degree, and less than 1% a PhD. In terms of school type, 76% worked in public schools, 19% in gymnasia or Daryn schools, and the remainder in private schools, public–private partnership schools. With regard to teaching profile, 56% mainly taught grades 6–9, 31% grades 1–5, and 13% grades 10 and above. A large majority (78%) had participated in some form of professional development in the previous 12 months. Experience with digital or AI tools in teaching was widespread: 47% reported that they regularly use such tools, 44% used them rarely, whereas 7% reported no experience and 3% were not sure.

3.3. Measures

All scales were measured using multiple items on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The original English items were taken from established HRM, AI readiness, growth mindset, and IWB research and adapted to the school context where required. The questionnaire was translated into Russian and Kazakh and then back-translated into English to ensure consistency with the original version. The translated versions were also reviewed for clarity and content validity, and the survey was piloted with a small group of teachers before the main data collection.

3.3.1. HRM practices

Perceived strategic HRM practices at the school level were measured with ten items covering two clusters of practices. The first cluster captured core HRM practices related to staffing, performance management, rewards and participation (e.g., fair hiring processes, fair and regular performance evaluation, competitive compensation and recognition, involvement in decision-making, and clear HR policies). The second cluster focused on professional development and support (e.g., induction for new teachers, ongoing professional development opportunities, relevance of training to teaching or administrative work, leadership support for learning, and access to learning resources). Together, these items reflect ability-, motivation- and opportunity-enhancing HRM practices in line with the AMO framework.

3.3.2. AI readiness

We measured teachers AI readiness with six items covering their confidence, knowledge, skills and perceived capability to use AI-based tools for educational goals. These items were modelled as reflective indicators of an overall capability-oriented AI readiness construct, consistent with our initial conceptualisation. Items asked about confident use of AI applications (such as chatbots and generative tools), ability to interpret and analyse AI-generated data, capacity to plan and coordinate AI-related projects in teaching, ability to engage students with AI-related topics, readiness to mentor students on AI projects, and active efforts to develop AI-related knowledge and skills. This scale was informed by recent conceptualisations of teacher AI readiness (e.g., Wang et al., 2023).

3.3.3. Growth mindset

Growth mindset was assessed with five items reflecting teachers' beliefs about the malleability of cognitive abilities. Items captured agreement with statements such as believing that intellectual abilities can develop over time, that people can substantially develop their talents regardless of

initial level, and that professional and intellectual abilities can be improved through effort, alongside a reverse-coded item expressing a more fixed view of basic mental abilities. The items were adapted from work on implicit theories of intelligence (Dweck et al., 1995) and recent applications to intelligent technologies (Dang & Liu, 2022).

3.3.4. Innovative work behaviour

Teachers' innovative work behaviour was measured with six items tailored to the school context. The scale captured the extent to which teachers actively seek new methods, technologies and tools to improve learning in the classroom; generate creative solutions to classroom or school-level problems; seek support from colleagues and school leaders to implement innovative ideas; integrate new strategies and tools into their everyday teaching; collaborate with colleagues to embed successful innovations into school routines; and regularly and deliberately introduce new ideas in their classes or school.

3.4. Measurement Model Assessment

All latent constructs were modelled reflectively. The measurement model was assessed in terms of indicator reliability, internal consistency, convergent validity and discriminant validity.

Standardised loadings for all indicators were above the recommended threshold of 0.70, with the exception of one HRM item (collegial support, $\lambda = 0.682$), which was retained because it captures an important content facet and its loading was close to the cut-off. Loadings for AI readiness items ranged from 0.859 to 0.895; for HRM items from 0.682 to 0.864; for IWB items from 0.749 to 0.842; and for growth mindset items from 0.730 to 0.850.

Internal consistency was satisfactory for all constructs. Cronbach's alpha ranged from 0.795 (growth mindset) to 0.878 (IWB). Composite reliability values (ρc) were between 0.850 (AI readiness) and 0.898 (HRM), exceeding the 0.70 benchmark. Average variance extracted (AVE) values were 0.760 for AI readiness, 0.637 for HRM, 0.624 for IWB and 0.619 for growth mindset, all above the 0.50 threshold, indicating adequate convergent validity (Table 1).

Discriminant validity was examined using the HTMT criterion. All HTMT values between the four substantive constructs were below 0.85, ranging from 0.357 (HRM–AI readiness) to 0.749 (growth mindset–IWB), supporting discriminant validity. Collinearity diagnostics for the indicators showed variance inflation factors (VIFs) between 1.42 and 4.12, below conservative cut-offs, suggesting that multicollinearity is unlikely to bias the estimates (Table 2).

Table 1 presents the indicator loadings, internal consistency reliability, and convergent validity results. Discriminant validity results based on the HTMT criterion are presented in Table 2.

Table 1
Measurement Model Results

Construct	*Items*	*Loadings*	*Cronbach α*	*CR*	*AVE*
HRM Practices	10	0.682–0.864	.857	.898	.637
AI Readiness	6	0.859–0.895	.837	.850	.760
Growth Mindset	5	0.730–0.850	.795	.866	.619
Innovative Work Behaviour	6	0.749–0.842	.878	.888	.624

Note. HRM: human resource management; AI: artificial intelligence; IWB: innovative work behaviour; CR: composite reliability; AVE: average variance extracted.

Table 2
Discriminant Validity [HTMT]

Construct	*HRM*	*AI Readiness*	*Growth Mindset*	*IWB*
HRM	—			
AI Readiness	0.357	—		
Growth Mindset	0.579	0.512	—	
Innovative Work Behaviour	0.567	0.629	0.749	—

Note. HRM: human resource management; AI: artificial intelligence; IWB: innovative work behaviour; HTMT: heterotrait–monotrait ratio.

3.5. Data Analysis

Data were analysed using partial least squares structural equation modelling [PLS-SEM] in SmartPLS. This approach is appropriate given the study's focus on prediction, the inclusion of a moderated mediation structure, and the sample size relative to model complexity. The analysis followed the standard two-step procedure: first evaluating the reflective measurement model, then assessing the structural model.

For the structural model, we examined path coefficients, coefficient of determination (R^2), effect sizes (f^2), and predictive relevance. Significance of direct, indirect and interaction effects was assessed using non-parametric bootstrapping with two-tailed tests at the 5% level. Mediation (H3) was evaluated through the bootstrapped indirect effect of HRM on IWB via AI readiness, alongside the remaining direct effect. Moderation (H4) was tested by including an interaction term between AI readiness and growth mindset, created as a product indicator construct. Conditional direct and indirect effects (H5) were derived at low (−1 SD), mean and high (+1 SD) levels of growth mindset.

To address potential common method bias, several procedural remedies were applied ex ante (assuring anonymity, using a neutral survey introduction, separating sections conceptually). Ex post, we inspected collinearity statistics; the absence of very high VIF values suggests that a single latent factor does not dominate the covariance structure, reducing the likelihood that common method variance severely distorts the results.

4. Results

4.1. Measurement Model

The measurement model results confirmed that the four reflective constructs are measured reliably and distinctively. All AI readiness indicators loaded strongly on their factor (0.859–0.895). HRM indicators showed loadings between 0.682 and 0.864, IWB indicators between 0.749 and 0.842, and growth mindset indicators between 0.730 and 0.850.

Cronbach's alpha values were .837 for AI readiness, .857 for HRM, .878 for IWB and .795 for growth mindset. Composite reliability [CR] values were .850 (AI readiness), .898 (HRM), .888 (IWB) and .866 (growth mindset). AVE values exceeded .60 for all constructs (.760, .637, .624 and .619 respectively), indicating that each construct explains more than half of the variance in its indicators.

The HTMT matrix showed that all inter-construct HTMT values were comfortably below .85. In particular, HTMT was .629 for AI readiness–IWB, .567 for HRM–IWB, .512 for AI readiness–growth mindset and .749 for growth mindset–IWB. These results support discriminant validity between AI readiness, HRM, growth mindset and IWB. Item-level VIF values for all indicators were below 5, indicating that multicollinearity is not a concern at the measurement level.

Global model fit indices for the saturated model indicated an SRMR of .069, which is within commonly used thresholds for approximate fit in PLS-SEM, although model evaluation in PLS focuses primarily on predictive accuracy rather than exact fit.

4.2. Structural Model

4.2.1. Explained variance and effect sizes

The model explained a moderate share of variance in the endogenous constructs. Perceived HRM practices accounted for 10.6% of the variance in AI readiness (R^2 = .106, adjusted R^2 = .102). AI readiness, HRM and growth mindset together explained 54.1% of the variance in IWB (R^2 = .541, adjusted R^2 = .533).

Effect size estimates indicated that HRM had a small-to-moderate effect on AI readiness (f^2 = .118) and a small effect on IWB (f^2 = .057). AI readiness had a moderate effect on IWB (f^2 = .186), while growth mindset had a moderate-to-large effect on IWB (f^2 = .225). The interaction term (AI readiness × growth mindset) had a negligible effect size (f^2 = .004). The explanatory power of the structural model is summarised in Table 3, showing that the model explained 10.6% of the

variance in AI readiness and 54.1% of the variance in IWB.

Table 3
Explained variance for the endogenous constructs

Variable	R^2	*Adjusted* R^2
AI Readiness	.106	.102
Innovative Work Behaviour	.541	.533

4.2.2. Direct effects

Consistent with H1, perceived HRM practices were positively associated with AI readiness (β = 0.325, t = 3.669, p < .001). In line with H2, AI readiness was positively related to IWB (β = 0.330, t = 4.961, p < .001). HRM also had a positive direct effect on IWB (β = 0.186, t = 2.537, p = .011), indicating that HRM practices are associated with teachers' innovative behaviour both directly and via AI readiness.

Growth mindset showed a significant positive direct association with IWB (β = 0.394, t = 5.563, p < .001), suggesting that teachers who believe more strongly in the malleability of cognitive abilities tend to report higher innovative work behaviour.

4.2.3. Mediation analysis

H3 proposed that AI readiness mediates the relationship between HRM practices and IWB. The indirect effect of HRM on IWB via AI readiness was positive and significant (β = 0.107, t = 3.242, p = .001). The total effect of HRM on IWB (β = 0.293, t = 3.660, p < .001) was larger than the direct effect (β = 0.186), indicating partial mediation: part, but not all, of the association between HRM practices and teachers' innovative work behaviour operates through AI readiness. Therefore, H3 was supported.

4.2.4. Moderation and conditional indirect effects

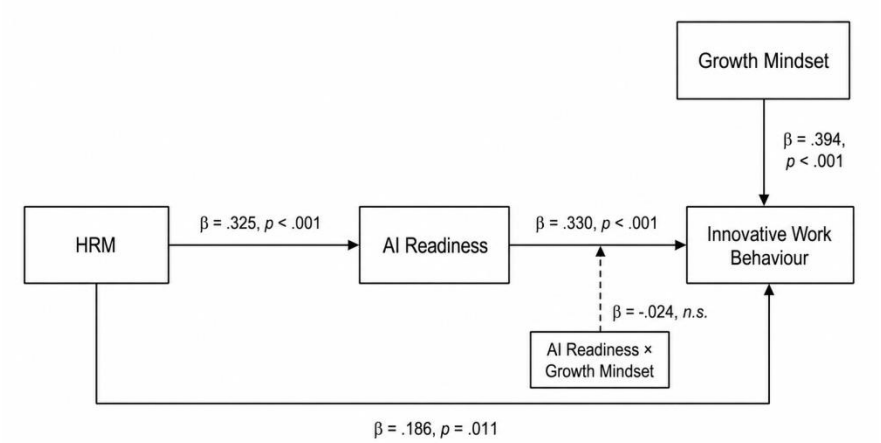
H4 predicted that growth mindset would positively moderate the relationship between AI readiness and innovative work behaviour, such that the relationship would be stronger for teachers with higher growth mindset. However, the interaction term between AI readiness and growth mindset was small and non-significant (β = −0.024, t = 0.401, p = .689), indicating that growth mindset does not significantly alter the strength of the association between AI readiness and innovative work behaviour.

Simple slope estimates showed that the effect of AI readiness on innovative work behaviour remained positive and statistically significant at low (−1 SD; β = 0.354, p < .001), mean (β = 0.330, p < .001) and high (+1 SD; β = 0.306, p < .001) levels of growth mindset. The slopes were very similar in magnitude, consistent with the non-significant interaction term and providing no empirical support for H4. Therefore, H4 was not supported.

Hypothesis 5 proposed that growth mindset would also moderate the indirect effect of HRM practices on innovative work behaviour via AI readiness, such that the indirect effect would be stronger at higher levels of growth mindset. Conditional indirect effects were very similar across levels of growth mindset (β = 0.115 at −1 SD; β = 0.107 at the mean; β = 0.099 at +1 SD), and the bootstrapped confidence intervals for these effects showed substantial overlap. In line with the non-significant interaction term, these differences were not statistically meaningful. Accordingly, H5 was not supported.

In short, the findings support the core mediation model whereby strategic HRM practices are associated with higher levels of teachers' AI readiness, which in turn relate to higher innovative work behaviour. However, the expected strengthening role of growth mindset in the AI readiness–IWB relationship and in the indirect effect of HRM practices was not observed in this sample. The final structural model with standardised path coefficients is presented in Figure 2, while Table 4 summarises the structural model results and hypothesis-testing outcomes.

Figure 2
Structural Model (Path Coefficients)



Note. Standardised path coefficients are reported. Solid paths indicate statistically significant relationships, whereas the interaction effect between AI readiness and growth mindset was not statistically significant.

Table 4
Structural Model Results

Hypothesis	*Relationship*	*β*	*t*	*p*	*Decision*
H1	HRM → AI readiness	.325	3.669	<.001	Supported
H2	AI readiness → IWB	.330	4.961	<.001	Supported
H3	HRM → AI readiness → IWB	.107	3.242	.001	Supported
H4	AI readiness × growth mindset → IWB	−.024	.401	.689	Not supported
H5	Conditional indirect effect	—	—	n.s.	Not supported

Note. HRM = human resource management; AI = artificial intelligence; IWB = innovative work behaviour; β = standardised path coefficient; n.s. = not significant.

5. Discussion

In this study, we examined whether teachers' perceptions of HRM practices were associated with innovative work behaviour [IWB] both directly and indirectly through AI readiness, and whether growth mindset conditioned the relationship between AI readiness and IWB and the corresponding indirect effect. Perceived HRM practices were positively associated with teachers' IWB, while AI readiness partially mediated this relationship. Thus, teachers who reported more favourable HRM practices also tended to report higher levels of AI readiness and innovative behaviour. Growth mindset showed a positive direct association with IWB but did not significantly moderate either the AI readiness–IWB relationship or the indirect relationship between HRM practices and IWB through AI readiness. Accordingly, H4 and H5 were not supported. Taken together, these findings suggest a meaningful distinction between the roles of organisational and personal resources in teachers' innovative behaviour. Perceived HRM practices appear to support IWB partly through a capability-building pathway involving AI readiness, whereas growth mindset contributes to innovative behaviour more directly rather than by strengthening the behavioural return of AI readiness.

The positive association between perceived HRM practices and AI readiness is broadly consistent with the ability–motivation–opportunity [AMO] perspective, according to which HRM practices can contribute to employee outcomes by developing abilities, sustaining motivation, and creating opportunities to apply those capabilities (Bos-Nehles et al., 2023). Evidence from school settings provides further support for this capability-building interpretation. Distributed leadership and professional learning communities have been shown to contribute to teachers' professional development (Yang & Chang, 2024), while large-scale evidence indicates that teachers' digital learning experiences can be translated into digital instructional practice through teaching efficacy and perceived professional learning needs (Park & Kim, 2026). Importantly, professional development focused specifically on technology can also produce changes that are closely

connected to innovation. Online ICT training has been found to strengthen teachers' TPACK competencies and innovative teaching practices, although contextual constraints can limit the extent to which newly developed capabilities are implemented in practice (Aydemir Altaş & Babacan, 2025).

The present mediation result extends this reasoning into the AI context. Recent evidence indicates that AI-related preparedness is responsive to structured developmental experiences. For example, participation in an AI-supported lesson-planning process significantly increased overall AI readiness and its cognitive, skill, and perception dimensions among science teacher candidates (Gürbüz et al., 2026). Similarly, technopedagogical competence has been positively associated with teachers' acceptance of AI, with TPACK significantly predicting AI acceptance among middle and high school teachers (Çakır & Güner, 2026). AI readiness has also been linked to the translation of technology-related beliefs and capabilities into innovative AI-integrated lesson design (Tusyanah et al., 2026). Related evidence from AI-supported practicum experiences further suggests that sustained engagement with generative AI can contribute to pedagogical reasoning, reflective decision-making, and instructional responsiveness (Danişman, 2026). Although some of these studies concern preservice rather than in-service teachers and do not examine HRM directly, collectively they reinforce the view that AI-related capacities are developable rather than fixed characteristics. AI readiness may therefore be understood not solely as an individual attribute but as a capability that can be partly enabled by the developmental opportunities and support structures available to teachers.

The partial nature of the mediation is also theoretically important. Perceived HRM practices remained associated with IWB after AI readiness was taken into account, indicating that AI readiness represents one mechanism rather than the sole pathway through which organisational practices are related to innovative behaviour. Previous HRM research similarly shows that HR practices can contribute to IWB through supportive workplace conditions, including management and coworker support (Prieto & Pérez-Santana, 2014). In educational settings, management support and exposure to innovation have also been associated with different stages of teachers' IWB (Lambriex-Schmitz et al., 2020), while transformational leadership, school climate, and teacher self-efficacy have been linked to teacher innovativeness (Hidayat & Patras, 2024). The present results therefore fit a broader view in which organisational practices influence innovation through several complementary mechanisms rather than through a single capability.

Evidence from the five-journal literature further highlights why such opportunity-related mechanisms should not be overlooked. Teachers may acquire new knowledge through professional development yet still experience difficulty transferring it into classroom practice when resources are inadequate or when policy and curriculum conditions are unstable (Parry & Kumi, 2026). Similarly, research on ICT implementation has identified insufficient resources, limited time, and gaps in structured professional development as constraints on teachers' ability to translate positive orientations toward technology into actual practice (Dorji et al., 2025). A multilevel analysis of school technology integration likewise indicates that teacher competence operates together with school leadership and broader system-level conditions rather than independently of them (Antwi, 2026). These findings help interpret the remaining direct HRM–IWB association in the present study. HRM practices may facilitate innovation by developing AI readiness, but they may also provide opportunities, resources, professional learning structures, and an organisational climate that enable teachers to act on innovative ideas.

The mediating role of AI readiness is also consistent with evidence directly connecting readiness with innovative educational outcomes. Wang et al. (2023) found that all four dimensions of teacher AI readiness—cognition, ability, vision, and ethics—positively predicted AI-enhanced innovation. This suggests that preparedness for AI involves more than willingness to adopt a technology; it may provide cognitive, practical, anticipatory, and ethical resources that support teachers in identifying and implementing new possibilities in their work. The present findings extend this line of research by positioning AI readiness between an organisational antecedent and the broader construct of IWB. In this respect, the results suggest a potentially important

organisational route to AI-related innovation: favourable workplace practices are associated with stronger AI readiness, which in turn is associated with greater innovative behaviour. This interpretation should nevertheless remain associative rather than causal given the design of the study.

Growth mindset showed a different pattern. Its positive direct association with IWB is consistent with previous evidence that individuals with stronger growth mindsets tend to engage more strongly in innovative behaviour (Liu & Tong, 2022). However, growth mindset did not significantly alter the strength of the AI readiness–IWB relationship. Thus, within the present model, AI readiness and growth mindset appear to make largely additive rather than interactive contributions to IWB. This result differs from findings in technology-intensive educational contexts in which growth mindset has functioned as a boundary condition. For example, Su et al. (2025) found that growth mindset buffered the adverse effects of technostress on TPACK and interdisciplinary teaching competence. However, the difference need not be interpreted as contradictory. The interaction examined by Su et al. concerned the capacity of mindset to protect professional resources under technological stress, whereas H4 concerned whether mindset amplifies the translation of an already developed capability—AI readiness—into innovative behaviour.

One possible explanation is therefore that growth mindset operates earlier in the capability-development process rather than at the point at which AI readiness is translated into IWB. This possibility is consistent with recent evidence showing that growth teaching mindset positively predicts the cognition, ability, vision, and ethics dimensions of AI readiness among in-service teachers (Ti et al., 2026). In other words, a growth-oriented teacher may be more willing to learn about AI, develop competence, reconsider existing practices, and engage with emerging ethical questions, thereby contributing to the development of readiness itself. Once a sufficient level of AI readiness has been developed, however, its association with IWB may not depend strongly on whether the teacher holds a higher or lower growth mindset. This interpretation is also compatible with emerging evidence that teachers' digital instructional behaviour reflects developmental pathways involving prior learning experiences, efficacy beliefs, and professional learning needs rather than a single dispositional characteristic (Park & Kim, 2026).

Accordingly, the nonsignificant moderation and moderated-mediation effects should not be interpreted as evidence that growth mindset is unimportant. Rather, the findings suggest that its theoretical location in the process may differ from that proposed in H4 and H5. Growth mindset may operate primarily as a developmental and motivational personal resource, whereas AI readiness represents a more proximal capability associated with the enactment of innovative behaviour. Future longitudinal research could examine this possibility directly by testing whether growth mindset precedes changes in AI readiness and whether such changes subsequently predict IWB. Such a temporal model would provide a stronger test of whether personal mindset and organisational support contribute to innovation through sequential rather than interactive mechanisms.

6. Implications

6.1. Theoretical Implications

Our research work has several theoretical contributions. First, the outcomes extend HRM and AMO research into the school context by showing that teachers' perceptions of HRM practices are associated with their IWB. This extends the usage of the AMO framework beyond traditional organisational context by showing how HRM practices can support teacher-level innovation in schools. The resuts are also consistent with recent evidence from Kazakhstan showing that school environments and organisational support factors can contribute to educational outcomes (Sarzhanova et al., 2026).

Second, the paper examines AI readiness as a mediating capability linking HRM practices with IWB. In doing so, we move beyond technology-acceptance perspectives by positioning AI readiness as an organisationally developable capability. This extends the HRM–innovation

literature by identifying an AI-specific capability mechanism linking HR practices with employee innovation.

Third, the findings refine the theoretical role of growth mindset in AI-enabled innovation. Growth mindset was directly associated with IWB but did not moderate the AI readiness–IWB relationship. Rather than serving as a boundary condition, it appears to operate as an independent, additive resource alongside AI-related capability. These results suggest that growth mindset may be better conceptualised as a parallel predictor of IWB or as an antecedent of AI readiness, rather than as a multiplicative moderator of the AI readiness–innovation relationship.

6.2. Practical Implications

For school leaders and policymakers, the findings highlight the importance of developing HRM policies that actively support innovation, including fair and developmental appraisal, targeted professional development, recognition of innovative teaching, and teacher participation in digitalisation and AI-related decision-making. Professional development should focus on AI-related skills and pedagogy rather than generic ICT training, while schools should also make it clear that experimentation with AI in the classroom is encouraged. A recent Kazakhstani study also reports that institutional strategies depend on effective implementation and psychologically safe school environments (Nurgabdeshov et al., 2026). At the same time, creating a culture that normalises learning, effort, and experimentation may help teachers develop a growth mindset, even though growth mindset did not significantly moderate the main relationships examined in this study. System-level policies should connect infrastructure investments with HRM and leadership initiatives that enable safe experimentation, rather than focusing solely on compliance with digital regulations.

7. Limitations and Future Research

This study has several limitations. First, it is based on cross-sectional, self-reported data from school teachers, which limits causal inference and generalisability. Longitudinal or experimental designs could help clarify potential causal pathways between HRM practices, AI readiness, and IWB. To address concerns regarding common method bias, future research should incorporate additional data sources, such as peer or leader ratings, observations, or administrative records. The model focuses on a limited number of factors; other mechanisms (e.g., psychological safety, leadership style, and school climate) and alternative moderators may provide further insight into when AI readiness leads to innovation. Finally, multilevel research that specifically models teachers nested within schools may provide a better understanding of how school-level HRM systems and policies influence individual-level AI readiness and innovation.

8. Conclusion

This study demonstrates that, in Kazakhstani schools, perceived strategic HRM practices are positively associated with teachers' AI readiness and innovative work behaviour, and that AI readiness contributes to explaining how HRM practices foster innovation. Growth mindset is also associated with higher levels of innovative work behaviour, but it does not strengthen the relationship between AI readiness and innovation in our sample. Drawing on the AMO framework, the findings underscore the role of HRM in providing resources that help teachers develop AI-related personal resources and engage in IWB.

For organisations seeking to use AI to improve employee outcomes, our findings suggest that investment in technology should be accompanied by HRM and professional development strategies that enhance employees' abilities, motivation, and opportunities to engage with AI in meaningful ways.

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Data availability: The datasets generated and/or analysed during the current study are available

from the corresponding author upon reasonable request.

Declaration of AI-assisted technologies in the writing process: During the preparation of this work, the authors used ChatGPT (OpenAI) solely for language editing and proofreading, including improving grammar, clarity, and readability. All intellectual content, analyses, interpretations, and conclusions are the authors' own.

Declaration of interest: The authors declare that they have no competing interests.

Ethical statement: The study received full ethical approval from the Scientific Research Ethics Committee of JSC "National Center for Research and Evaluation of Education 'Taldau' named after Akhmet Baitursynuly", Kazakhstan (Approval No. ER-2025-003). All participants were informed about the purpose of the study, confidentiality arrangements, and their rights, and provided electronic informed consent prior to participation.

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