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Students' Perceived Teacher Readiness and Student Satisfaction as Predictors of AI Integration in Indonesian Vocational High Schools

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Abstract. Meaningful artificial intelligence (AI) integration in vocational education involves not only technical infrastructure but also students' perceptions of teacher readiness and their learning experiences. However, evidence explaining how these factors are associated with AI integration in Indonesian vocational high schools remains limited. This study aimed to examine the direct and mediated relationships among students' perceived teacher readiness, student satisfaction, and AI integration. A cross-sectional explanatory survey was conducted with students from five public and private vocational high schools in Yogyakarta. Of 105 questionnaires distributed, 99 complete responses were analysed. Participants were recruited through teacher-facilitated sampling. Quantitative data were analysed using partial least squares structural equation modelling, while open-ended responses were analysed through descriptive thematic coding to contextualise the findings. Students' perceived teacher readiness was positively associated with AI integration and student satisfaction, while student satisfaction was positively associated with AI integration. Student satisfaction partially mediated the relationship between perceived teacher readiness and AI integration. The model explained 32.4% of the variance in student satisfaction and 68.1% in AI integration. Open-ended responses highlighted pedagogical judgement, practical professional development, ethical validation, equitable access, rapid feedback, and practice-oriented simulation. The conclusions are limited to student perceptions and the participating schools in this context.

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PENDAHULUAN

Artificial intelligence in education (AIEd) is increasingly used to support tutoring, feedback, assessment, learning-resource generation, and personalised learning (Hwang et al., 2020; Chiu, 2021; Chiu et al., 2023; Kamalov et al., 2023; Luan et al., 2020). These functions are particularly relevant to technical and vocational education and training (TVET), where learning must connect conceptual understanding with practical competence, workplace procedures, and changing industrial technologies (Hassan et al., 2021; Liu et al., 2020). Nevertheless, introducing AI tools does not by itself ensure meaningful integration. Their educational value depends on how well the technology is aligned with teaching goals, vocational tasks, assessment practices, and learner needs. Teacher readiness is therefore a central condition of AI-supported learning. The technological pedagogical content knowledge (TPACK) framework explains that effective technology integration requires the interaction of technological, pedagogical, and content knowledge rather than technical proficiency alone (Mishra & Koehler, 2006). Recent studies similarly show that readiness is associated with task-technology fit, pedagogical judgement, professional learning, resource support, and the ability to respond to learner needs (Chou et al., 2023; Almusawi & Durugbo, 2024). In this study, however, readiness is not assessed through teachers' self-reports. It is operationalised as students' perceived teacher readiness (PTR), referring to students' evaluations of whether their teachers appear able to select, explain, manage, and pedagogically use AI in vocational learning. Student satisfaction is another important condition because students directly experience the accessibility, usefulness, clarity, and relevance of AI-supported activities. The DeLone and McLean Information Systems Success Model positions user satisfaction as an evaluative response to system and information experiences that is linked to use and perceived benefits (DeLone & McLean, 2003). In educational settings, satisfaction is influenced not only by the presence of technology but also by teaching quality, feedback, usability, relevance, and the extent to which technology supports learning needs (Chen et al., 2022; Kanwar & Sanjeeva, 2022). Evidence also indicates that students may welcome some AI applications while remaining uncomfortable with inaccurate, high-stakes, or poorly explained uses (Rodway & Schepman, 2023).
AIEd research has largely focused on applications such as profiling and prediction, intelligent tutoring, automated assessment, feedback, and adaptive learning (Ouyang et al., 2022; Zawacki-Richter et al., 2019). TVET studies similarly emphasise updating curricula, laboratories, equipment, educator competence, and workforce-development policies (Hassan et al., 2021). However, this application-oriented literature does not fully explain why AI is meaningfully integrated in some settings but remains superficial or underused in others, leaving the human and pedagogical conditions of implementation insufficiently understood.

Effective teacher readiness extends beyond operational skill to technological knowledge, pedagogical capability, beliefs and attitudes, task–technology compatibility, classroom management, resource access, and awareness of student conditions (Almusawi & Durugbo, 2024; Andarwulan et al., 2021; Champa et al., 2019; Eslaminejad et al., 2010; Soetan & Coker, 2018). Student satisfaction likewise reflects instructional, learner, technological, and broader learning experiences (Malhotra et al., 2023).. Although relevant to AI integration, these research streams have generally developed separately.

TPACK explains that meaningful integration requires coordinated technological, pedagogical, and content knowledge (Mishra & Koehler, 2006), while the DeLone and McLean Information Systems Success Model positions satisfaction as a mechanism linking positive user evaluations with use and benefits (DeLone & McLean, 2003). Together, these perspectives suggest that teacher readiness may strengthen AI integration directly and indirectly through student satisfaction.

Table 1. Analytical synthesis of prior studies and multidimensional research gaps

Study and main evidence	**Theoretical, methodological, contextual, and practical gaps**	**How the present study advances knowledge**
(Hassan et al., 2021): A literature-based analysis found limited diffusion of ICT across several stages of the TVET training cycle.	Theoretical: Does not link teacher capability, learner response, and integration. Methodological: Does not test direct or indirect effects. Contextual: Focuses on ICT broadly rather than AI-supported teaching in Indonesian TVET. Practical: Provides no tested adoption mechanism.	Tests a structural model linking teacher readiness, student satisfaction, and AI integration.
(Chen et al., 2022): A survey linked vocational-student satisfaction to teaching methods and teacher attitudes.	Theoretical: Does not connect satisfaction with AI integration or an information-system success framework. Methodological: Does not examine mediation. Contextual: Does not focus on AI-supported vocational learning. Practical: Does not explain how teacher readiness may improve satisfaction.	Positions satisfaction as an explanatory mechanism in AI-enabled TVET.
(Chou et al., 2023): A quantitative study examined teachers' perceived efficacy in accessing AI-based teaching applications.	Theoretical: Perceived efficacy is narrower than multidimensional readiness and is not linked to satisfaction. Methodological: Uses only the teacher perspective and does not test a teacher-to-student pathway. Contextual: Does not explain AI integration in TVET. Practical: Provides limited evidence on learner acceptance.	Extends the teacher-readiness construct and tests its direct and indirect relationships with AI integration.
Broader AIEd reviews (Ouyang et al., 2022; Zawacki-Richter et al., 2019): Research is dominated by AI applications, systems, and learner-facing functions.	Theoretical: Educator and learner factors are rarely integrated. Methodological: Application mapping does not test structural relationships among readiness, satisfaction, and integration. Contextual: Evidence is concentrated in general and higher education. Practical: Implementation guidance remains fragmented.	Integrates TPACK and the IS Success Model in a TVET-specific empirical model.

Existing research leaves several gaps. Studies of AI in TVET have largely emphasised infrastructure, applications, workforce preparation, or teacher efficacy, whereas fewer studies have examined how students simultaneously evaluate teacher readiness, their own satisfaction, and the extent of AI integration in vocational learning (Hassan et al., 2021; Chou et al., 2023). Research on student satisfaction has often

been conducted in higher education or has addressed general teaching quality rather than AI-supported vocational learning (Chen et al., 2022; Rodway & Schepman, 2023). Moreover, teacher readiness is commonly measured from teachers' perspectives, leaving limited evidence on whether students' perceptions of teacher readiness are directly or indirectly associated with AI integration through satisfaction.

This gap is particularly relevant to Indonesian vocational high schools, where AI adoption varies with infrastructure, teacher experience, and student access. Although student reports cannot replace teacher or institutional evidence, they can show whether readiness is visible in practice and whether AI-supported learning is coherent, useful, and supportive. Accordingly, PTR, student satisfaction (SS), and AI integration (AII) are treated as student-reported constructs, and the study's claims are limited to the participating schools.

TPACK and the explanatory logic of the Information Systems Success Model underpin the proposed relationships. When teachers are perceived as technologically and pedagogically prepared, students are more likely to experience AI activities aligned with learning objectives and vocational tasks. These experiences may strengthen satisfaction and AI integration, while satisfaction may partly transmit this relationship when AI-supported learning is perceived as useful, understandable, and relevant.

Based on this argument, four hypotheses were formulated:

H1. Students' perceived teacher readiness is positively associated with AI integration.

H2. Students' perceived teacher readiness is positively associated with student satisfaction.

H3. Student satisfaction is positively associated with AI integration.

H4. Student satisfaction mediates the association between students' perceived teacher readiness and AI integration.

This study examines the direct relationships among PTR, SS, and AII and tests the mediating role of SS among vocational high school students in Yogyakarta. It contributes theoretically by integrating teacher-readiness and information-systems-success perspectives in a student-reported model, methodologically by operationalising readiness from the student perspective and combining PLS-SEM with supplementary open-ended responses, and practically by identifying conditions associated with meaningful AI integration in vocational learning.

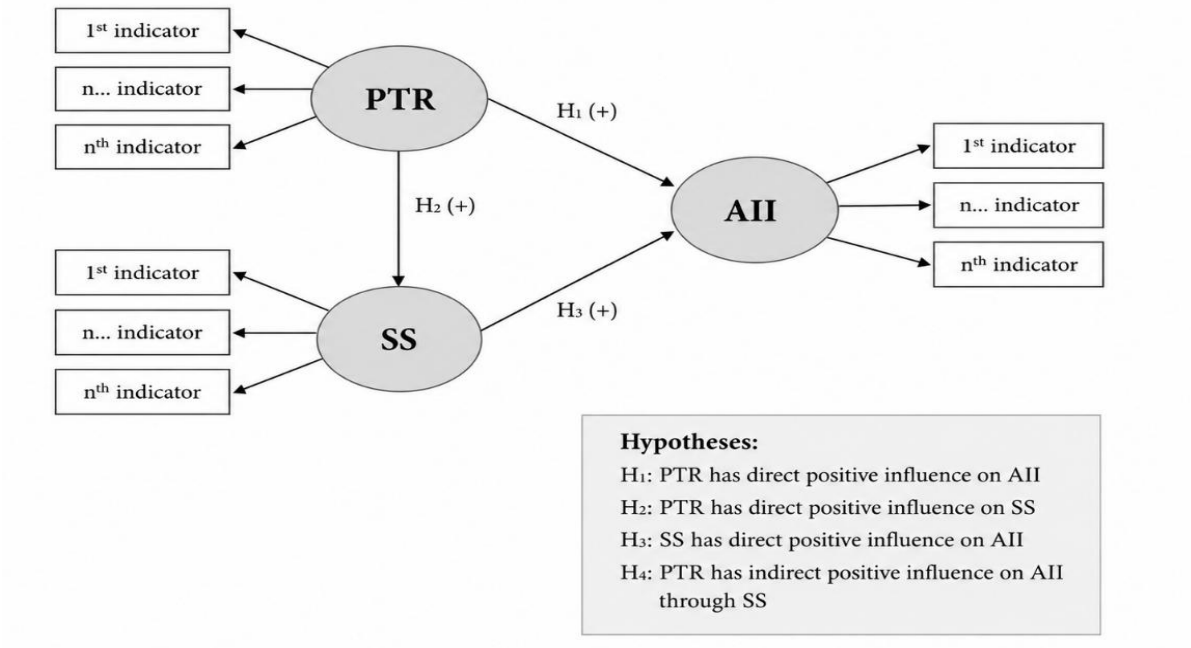


Figure 1. Proposed Conceptual model and Hypotheses

METODE

Research Design

This study employed a cross-sectional explanatory quantitative survey with supplementary open-ended responses. The quantitative component tested the proposed direct and mediated relationships among students' perceived teacher readiness (PTR), student satisfaction (SS), and AI integration (AII). The open-ended items were used to contextualise the statistical findings by identifying how students described teacher readiness, satisfaction, and priority areas for AI integration. The study was not designed as a full mixed-methods investigation because the open-ended responses did not constitute an independent qualitative strand.

Participants and Sampling

The study involved 99 students from five public and private vocational high schools in Yogyakarta, Indonesia. Participants were recruited through teacher-facilitated sampling, with representation from both public and private schools. Designated teachers distributed the questionnaire to eligible students between June and August 2024. A total of 105 questionnaires were distributed, and 99 complete responses were retained, producing a usable response rate of 94.3%. Six incomplete questionnaires were excluded.

Sample adequacy was assessed using statistical power analysis. The most complex endogenous construct in the proposed model had two predictors. Using a multiple-regression approximation with two predictors, a significance level of 0.05, statistical power of 0.80, and a medium effect size of $f^2 = 0.15$, the minimum required sample size was 68 respondents. Therefore, the final sample of 99 respondents exceeded the minimum requirement and was considered adequate for the PLS-SEM analysis.

The unit of analysis was the individual student. Since students completed all questionnaires, the teacher-related construct was operationalized as Students' Perceived Teacher Readiness (PTR) rather than teachers' self-reported readiness. PTR reflects students' evaluations of their teachers' knowledge, pedagogical capability, task–technology alignment, guidance, and support in using AI for vocational learning. AI integration was likewise assessed from the students' perspective as the perceived extent to which AI was embedded in teaching, learning, assessment, feedback, and learning support.

Instrument and Measures

The final analytical model comprised 18 reflective indicators measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree): six PTR items, six SS items, and six AII items. The final analytical model comprised 18 reflective indicators measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree): six PTR items, six SS items, and six AII items. The questionnaire also included four demographic questions. The operational definitions, final indicators, and literature bases of the three constructs are presented in Table 3.

Instrument Development and Pilot Testing

The questionnaire items were developed through a synthesis of relevant literature rather than directly adapted from a single existing instrument. The development process followed the instrument-development procedure proposed by Fajaryati et al. (2021) and Tsang et al. (2017), which involved defining the constructs, preparing an instrument blueprint, formulating items based on the identified indicators, conducting content validation, pilot-testing the instrument, analysing item consistency, and estimating preliminary reliability. Content validation was conducted by three experts with expertise in AI in education, TVET, and educational measurement. The experts assessed the relevance, clarity, representativeness, and contextual appropriateness of the items. Their feedback was used to revise ambiguous wording, remove redundant items, and improve the alignment between the items and their respective indicators.

The revised questionnaire was pilot-tested with 30 vocational high-school students who were not included in the final sample (Perneger et al., 2015). The pilot test examined item comprehensibility, response variation, and preliminary internal consistency. Item consistency was assessed using corrected item–total correlations, and items with coefficients below 0.30 were

reviewed, revised, or removed. Preliminary reliability was assessed using Cronbach's alpha, with values of 0.70 or higher considered acceptable (Mohajan, 2017). Following expert review and pilot testing, 18 reflective indicators were retained for the final analytical model: six PTR items, six SS items, and six AII items.

Table 2. Data collecting in this research

Construct	Operational definition	Final indicators	Basis
Students' Perceived Teacher Readiness (PTR)	Students' perceptions that their teachers can select, explain, manage, and pedagogically use AI in vocational learning.	Six reflective indicators (PTR1–PTR6)	Developed based on a synthesis of teacher-readiness and technology-integration literature, including Chou et al. (2023) and Almusawi and Durugbo (2024).
Student Satisfaction (SS)	Students' satisfaction with the usefulness, clarity, accessibility, and learning support experienced in AI-supported learning activities.	Six reflective indicators (SS1–SS6)	Developed based on a synthesis of vocational student-satisfaction literature, including Chen et al. (2022), Mohammadi Zenouzagh et al. (2023), and Malhotra et al. (2023).
AI Integration in TVET (AII)	Students' perceptions of the extent to which AI is incorporated into learning activities, feedback, assessment, and vocational practice.	Six reflective indicators (AII1–AII6)	Developed based on a synthesis of AIEd and TVET literature, including Ouyang et al. (2022), Zawacki-Richter et al. (2019), and Hassan et al. (2021), and refined through expert review.

Open-Ended Questions and Analysis

Three open-ended questions asked respondents to identify factors influencing perceived teacher readiness, factors influencing student satisfaction, and priority areas for AI integration in vocational learning. The responses were analysed using descriptive thematic coding. The researchers read the responses repeatedly, grouped semantically similar statements, compared categories across the three questions, and selected representative quotations. The quotations were translated from Indonesian into English while preserving their original meanings and were identified using anonymous respondent codes from R01 to R99.

Data Collection and Ethical Considerations

Data were collected using an online questionnaire between June and August 2024. Permission to conduct the study was obtained from the five participating vocational high schools. Before completing the questionnaire, students received information about the purpose of the study, the voluntary nature of participation, the confidentiality and anonymity of their responses, and their right to withdraw without academic consequences. Informed consent was obtained before data collection. No personally identifying information was collected, and the findings were analysed and reported anonymously.

Data Analysis

Descriptive statistics, including means, standard deviations, minimum values, and maximum values, were used to summarise the indicator and construct scores. The hypothesised relationships were tested using partial least squares structural equation modelling in SmartPLS version 4.1, with a path-weighting scheme and reflective Mode A measurement (Ringle et al., 2020; Sarstedt et al., 2014).. The analysis proceeded in two stages. First, the measurement model was assessed using outer loadings, Cronbach's alpha, rho_A, composite reliability (rho_C),

average variance extracted (AVE), the Fornell–Larcker criterion, the heterotrait–monotrait ratio (HTMT), and variance inflation factor values. Second, the structural model was evaluated using standardised path coefficients, R^2, adjusted R^2, f^2 effect sizes, and direct, indirect, and total effects.

Statistical significance was evaluated using nonparametric bootstrapping with 10,000 resamples, two-tailed tests, an alpha level of .05, and 95% bias-corrected and accelerated confidence intervals. A hypothesis was supported when the estimated coefficient had the expected direction, the p-value was below .05, and the confidence interval did not include zero. Mediation was assessed using the bootstrapped specific indirect effect of PTR on AII through SS. The mediation type was determined by the significance and direction of the direct and indirect effects, as well as the variance accounted for (VAF).

RESULT AND DISCUSSION

The mean construct scores were 3.70 for students' perceived teacher readiness, 2.94 for student satisfaction, and 3.06 for AI integration. Students therefore rated perceived teacher readiness more positively than their satisfaction with AI-supported learning and the current level of AI integration. These descriptive results represent students' perceptions and should not be interpreted as direct assessments of teachers' competence or institution-wide implementation.

Table 3. Measurement Model Reliability and Convergent Validity

Construct	Items	Outer-loading range	Cronbach's alpha	rho_A	rho_C	AVE
PTR	PTR1-PTR6	0.746-0.880	0.902	0.902	0.925	0.674
SS	SS1-SS6	0.748-0.907	0.895	0.902	0.920	0.660
AII	AII1-AII6	0.701-0.862	0.881	0.889	0.910	0.630

Table 4. Fornell–Larcker Criterion

Construct	PTR	SS	AII
PTR	0.821	0.569	0.732
SS	0.569	0.812	0.730
AII	0.732	0.730	0.794

Note. Diagonal values are the square roots of AVE; off-diagonal values are construct correlations

Table 5. HTMT Assessment

Construct pair	HTMT	CI lower	CI upper	Decision
PTR–SS	0.625	0.484	0.731	Established
PTR–AII	0.813	0.700	0.897	Established
SS–AII	0.822	0.703	0.896	Established

Table 6. Inner Collinearity Assessment

Endogenous construct	Predictor	Inner VIF
SS	PTR	1.000
AII	PTR	1.479
AII	SS	1.479

The square root of each construct's AVE exceeded its correlations with the other constructs. HTMT values ranged from 0.625 to 0.822, and the upper limits of the 95% bootstrapped confidence intervals remained below 1. Inner VIF values ranged from 1.000 to 1.479, indicating that collinearity was not a critical concern.

Structural Model and Hypothesis Testing

The structural model explained 32.4% of the variance in student satisfaction (R^2 = 0.324; adjusted R^2 = 0.317) and 68.1% of the variance in AI integration (R^2 = 0.681; adjusted R^2 = 0.674). Thus, PTR explained approximately one-third of the variance in SS, while PTR and SS jointly explained more than two-thirds of the variance in AII.

Students' perceived teacher readiness positively predicted AI integration (β = 0.468, t = 6.580, p < .001, 95% BCa CI [0.322, 0.602]) and student satisfaction (β = 0.569, t = 10.176, p < .001, 95% BCa CI [0.438, 0.661]). Student satisfaction also positively predicted AI integration (β = 0.464, t = 6.584, p < .001, 95% BCa CI [0.320, 0.596]). The f^2 values were 0.463, 0.479, and 0.456, respectively, indicating large effects for all three direct relationships. Thus, H1, H2, and H3 were supported.

Table 7. Structural Model and Hypothesis Testing Results

Hypothesis	Relationship	β	t	p	95% BCa CI	f^2	Effect	Decision
H1	PTR → AII	0.468	6.580	< .001	[0.322, 0.602]	0.463	Large	Supported
H2	PTR → SS	0.569	10.176	< .001	[0.438, 0.661]	0.479	Large	Supported
H3	SS → AII	0.464	6.584	< .001	[0.320, 0.596]	0.456	Large	Supported
H4	PTR → SS → AII	0.264	5.487	< .001	[0.167, 0.354]	N/A	N/A	Supported

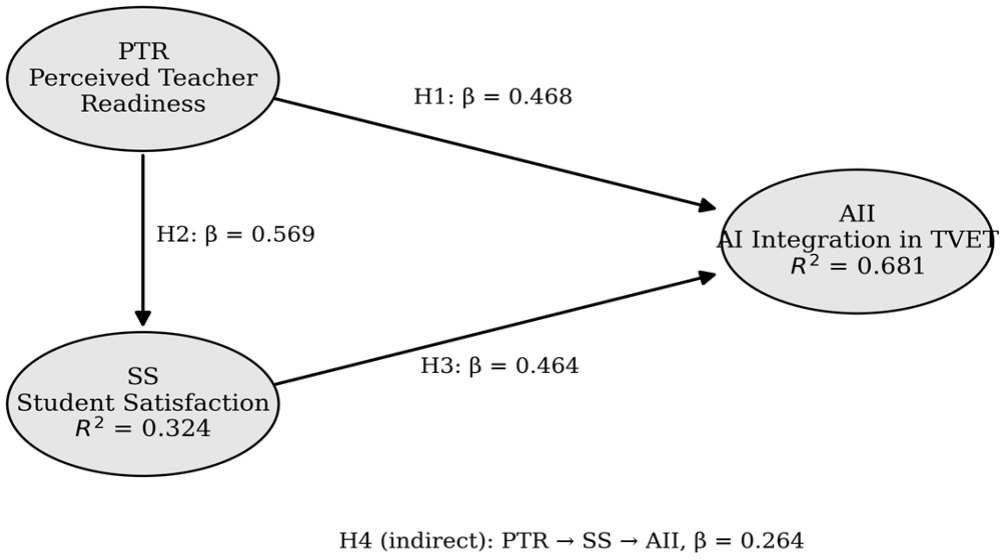


Figure 2 Estimated structural model

Mediation Analysis

The specific indirect effect of students' perceived teacher readiness on AI integration through student satisfaction was positive and significant (β = 0.264, t = 5.487, p < .001, 95% BCa CI [0.167, 0.354]). The direct effect remained positive and significant, and the total effect was 0.732. The VAF was 36.1%. Because the direct and indirect effects were both significant and operated in the same direction, student satisfaction demonstrated complementary partial mediation. H4 was therefore supported.

Table 8. Mediation Assessment

Relationship	Direct effect	Indirect effect	Total effect	VAF	Indirect 95% CI	Mediation type
PTR → AII	0.468	0.264	0.732	36.1%	[0.167, 0.354]	Complementary partial mediation

Open-Ended Findings

Table 9. Themes and Representative Open-Ended Responses

Theme	Analytical summary	Representative translated quotation
Pedagogical judgement	Readiness involves deciding why, when, and how AI should be used, not merely operating an application.	"The ability to teach with technology is as important as the ability to operate the application. Teacher readiness is more evident in decisions about when and how to use it." (R01)
Practical professional development	Teachers were perceived as willing to adopt AI but still needed vocationally relevant examples and practical guidance.	"Examples of AI applications that are genuinely relevant to vocational learning remain limited. Some teachers are willing to try, but they are still unsure about how to begin." (R07)
Critical and ethical use	Readiness includes checking accuracy and considering ethical and security risks.	"Teachers need to be able to verify the accuracy of information while also considering ethical and security issues." (R14)
Student learning experience	Satisfaction was linked to rapid, understandable feedback combined with teacher validation.	"Students tend to be more satisfied when they receive rapid responses that help them understand the material. Teachers still need to evaluate the results to ensure that they remain connected to the students' learning context." (R02)
Equitable access	Unequal devices and internet access remained a barrier to consistent AI-supported learning.	"The availability of devices and stable internet access remains uneven. Some teachers still prefer to wait because they do not yet feel sufficiently prepared." (R45)
Practice-oriented integration	Respondents prioritised simulations and authentic vocational tasks while retaining teacher judgement.	"Technologies such as virtual reality, digital twins, and simulation can support work processes that are difficult to conduct in laboratories. Final decisions should remain with teachers who understand the students' context." (R42)

Note. *All quotations were originally provided in Indonesian and translated into English by the authors. Minor grammatical adjustments were made for readability without altering the original meaning*.

The open-ended responses showed that students viewed teacher readiness as extending beyond technical skill and associated meaningful AI integration with pedagogical judgement, accessibility, feedback, and practice-oriented applications. These findings supplemented the quantitative model.

Discussion

Students' perceived teacher readiness and student satisfaction were positively associated with student-reported AI integration, with student satisfaction partially mediating the PTR–AII relationship. The model explained 68.1% of the variance in AII, indicating explanatory power within the sample rather than causality or out-of-sample predictive performance.

Students' Perceived Teacher Readiness and AI Integration

The positive PTR–AII association suggests that AI integration is more visible when teachers align technology with pedagogy, vocational content, and classroom management. This interpretation is consistent with TPACK, which views integration as the coordinated use of technological, pedagogical, and content knowledge (Mishra & Koehler, 2006), and with evidence highlighting task–technology fit, professional learning, resource support, and learner demand (Chou et al., 2023; Almusawi & Durugbo, 2024). Open-ended responses further distinguished technical operation from understanding when, why, and how AI should be used in vocational learning.

Students' Perceived Teacher Readiness and Student Satisfaction

The strongest relationship was between PTR and SS ($\beta = 0.569$), suggesting that student satisfaction depends strongly on teacher mediation rather than on AI availability alone. When teachers clarify the purpose of AI-supported activities, connect them to vocational tasks, provide guidance, and verify AI-generated outputs, students may perceive the technology as clearer, safer, and more relevant. This interpretation aligns with evidence that teaching methods and teacher attitudes are central to students' evaluations of learning quality (Chen et al., 2022).

The comparatively lower mean score for student satisfaction further suggests that perceived teacher readiness does not automatically ensure a consistently positive learning experience. Satisfaction may also depend on technological usability and reliability, device and internet access, occupational relevance, feedback quality, and learner support. Teacher development should therefore be accompanied by learner-centred instructional design and adequate institutional support.

Student Satisfaction and AI Integration

The positive SS–AII association suggests that meaningful AI integration is also experiential. Students reported stronger integration when AI-supported activities provided clear feedback, supported practical learning, and addressed their needs. This aligns with the Information Systems Success Model, which links user satisfaction with system use and perceived benefits (DeLone & McLean, 2003).

However, evidence that uncomfortable, high-stakes, inaccurate, or poorly explained AI applications may reduce projected satisfaction underscores the need for careful instructional design and teacher validation (Rodway & Schepman, 2023). Therefore, vocational AI integration should be evaluated not only by technical functionality but also by accessibility, relevance, usefulness, and instructional support.

Mediating Role of Student Satisfaction

The significant indirect effect and VAF of 36.1% indicate complementary partial mediation, with PTR associated with AII both directly and indirectly through SS. Perceived teacher readiness may shape the quality and structure of AI-supported activities, while satisfaction reflects students' experiential responses. When such learning is understandable, useful, relevant, and adequately supported, students may view AI as more meaningfully integrated.

Because the direct PTR–AII association remained significant, satisfaction is not the only linking mechanism. Infrastructure, institutional support, curriculum alignment, prior digital experience, device and internet

access, and vocationally relevant applications may also contribute. Thus, perceived teacher readiness and student satisfaction function as complementary rather than interchangeable conditions of AI integration.

Integration of Open-Ended Findings

The open-ended findings help explain the statistical relationships by showing that respondents viewed AI integration from multiple perspectives, including pedagogical judgement, practical teacher training, ethical validation, unequal access, rapid feedback, authentic vocational tasks, and simulations of costly or risky work processes. These themes indicate that vocational AI integration is not a single technical decision but an implementation process shaped by teacher judgement, student experience, institutional conditions, and vocational authenticity.

The responses also show that teacher readiness extends beyond technical proficiency. Students linked readiness to evaluating AI-generated information, aligning AI with practical learning objectives, providing guidance, and deciding when its use is appropriate. Student satisfaction was similarly associated with clear and rapid feedback, practical relevance, accessibility, and continued teacher involvement. These responses contextualise the quantitative findings without constituting a separate qualitative test of the structural model.

Theoretical Contribution

The study contributes theoretically by linking students' perceived teacher readiness, student satisfaction, and AI integration in a mediated model. TPACK explains why readiness involves pedagogical and content-related judgement alongside technological knowledge, while the Information Systems Success Model positions satisfaction as an experiential pathway associated with technology use and perceived benefits.

Rather than testing the framework in full, the study applies its explanatory logic to a context-specific, student-reported model. The partial mediation finding shows that perceived teacher readiness is associated with AI integration through two complementary pathways: directly through visible instructional implementation and indirectly through students' satisfaction with AI-supported learning.

Methodological Contribution

Methodologically, the study distinguishes students' perceived teacher readiness from teachers' self-reported readiness, capturing whether readiness is visible in classroom practice while recognising that student perceptions cannot replace teacher data, classroom observations, or institutional records. Combining PLS-SEM with supplementary open-ended responses also contextualises the statistical relationships without claiming a separate qualitative strand or full mixed-methods design. The responses clarified how students interpreted teacher readiness, satisfaction, and meaningful AI integration.

Practical Implications

The findings suggest that school-level AI initiatives should integrate technical training, pedagogical design, vocationally relevant examples, and procedures for validating AI-generated information. Professional development should help teachers judge when AI is appropriate, align it with learning objectives and practical assessment, evaluate output accuracy and ethical implications, and communicate its limitations to students.

Schools should also reduce inequalities in device and internet access, provide technical support, and prioritise applications with clear learning value, including formative feedback, error diagnosis, remedial and personalised support, competence monitoring, and simulations of costly or risky work processes.

Because student satisfaction partially mediates the PTR–AII association, schools should evaluate not only AI use but also students' experiences, including instructional clarity, usability, accessibility, feedback quality, practical relevance, and support for vocational competence. These human-centred priorities align with Industry 5.0's value-driven emphasis, although Industry 5.0 was not measured in this study (Xu et al., 2021).

Limitations and Future Research

Several limitations should be noted. The cross-sectional design identifies associations but not causality, and all constructs were student-reported; thus, PTR reflects students' perceptions rather than teachers' actual competence or school-wide

implementation. The sample of 99 students from five vocational high schools in Yogyakarta also limits generalisation across regions and TVET levels. The study further lacked teacher reports, classroom observations, school-level implementation data, longitudinal evidence, and out-of-sample predictive assessment using PLSpredict. Future research should integrate student, teacher, and institutional data, recruit larger and more diverse samples, compare vocational fields, and use longitudinal or intervention designs to examine how professional development and school support relate to AI integration over time.

CRediT authorship contribution statement

Nuryake Fajaryati, Methodology, Investigation, Data curation, Writing – original draft; **Pipit Utami**, Conceptualization, Methodology, Formal analysis, Writing – review & editing; **Putu Sudira**, Conceptualization, Supervision, Project administration, Validation, Writing – review & editing; **Mohd. Erfy Bin Ismail**, Writing – review & editing**; Yussi Anggraini**, Investigation, Data curation, Writing – review & editing; **Rangga Bayu Rinawan**, Investigation, Data curation, Writing – review & editing; **Budi Setiawan**, Validation, Writing – review & editing.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Declaration of the use of AI

During the preparation and revision of this manuscript, the authors used ChatGPT (OpenAI) and Grammarly to assist with language editing, grammatical correction, proofreading, and paraphrasing to improve the clarity and readability of the manuscript. The authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

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CONCLUSION AND SUGGESTION

This study examined the relationships among students' perceived teacher readiness, student satisfaction, and AI integration in five vocational high schools in Yogyakarta, Indonesia. PTR was positively associated with both student satisfaction and AI integration, while student satisfaction was also positively associated with AI integration. The strongest direct relationship was found between PTR and student satisfaction (β = 0.569). Student satisfaction partially mediated the relationship between PTR and AII, with an indirect effect of 0.264, a total effect of 0.732, and a VAF of 36.1%. The model explained 32.4% of the variance in student satisfaction and 68.1% of the variance in AI integration. These findings indicate that student-reported AI integration is associated with both students' perceptions of teacher readiness and the quality of their AI-supported learning experiences. The study contributes theoretically by linking teacher-readiness and information-systems-success perspectives within a student-reported mediation model.

The findings suggest that vocational high schools should prioritise pedagogical AI training, validation of AI-generated outputs, equitable access to technology, formative feedback, and vocationally authentic applications such as simulation-based practice

and competence monitoring. However, the conclusions are limited by the cross-sectional design, the reliance on student perceptions, and the inclusion of only five participating schools. Future research should incorporate teacher and institutional data, use broader and more diverse samples, and examine AI implementation through longitudinal or intervention-based designs.

Vocational high schools should combine pedagogical AI training, validation of AI-generated outputs, equitable technological access, continuous student feedback, and vocationally authentic applications such as formative assessment, competence monitoring, and simulation-based practice. Future research should use broader samples, incorporate teacher and institutional data, and employ longitudinal, intervention-based, or multilevel designs to examine how AI integration develops across different vocational education contexts.

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