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Investigating Trust and Adoption of Artificial Intelligence Practices in Teaching and Learning Among Science and Language Teachers

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ABSTRACT

Purpose. This study investigates the relationship between the perceived ease of use of AI tools and the level of trust that language and science teachers have in them. It compares the adoption rates of AI tools among language and science teachers in secondary schools within the Arab society in Israel. The study also assesses how professional development (PD) and training influence these adoption rates while considering teaching discipline and years of experience. **Methodology**. By utilizing the Technology Acceptance Model (TAM) and Diffusion of Innovations Theory, a correlational quantitative research method was used in this study. Statistical techniques helped to assess the strength and direction of these correlations, focusing on variables of the study. The sample comprised 120 teachers, evenly split through convenience sampling techniques between 60 science teachers and 60 language teachers. **Results**. Results indicate that perceived ease of use strongly correlates with trust in AI tools ($r = 0.65$, $p < 0.01$). Science teachers exhibit higher AI adoption ($M = 3.65$, $SD = 0.80$) compared to language teachers ($M = 3.25$, $SD = 0.65$), with a significant difference ($t = -2.15$, $p < 0.05$). Additionally, professional development (PD) has a significant predictive value for AI adoption ($\beta = 0.50$, $p < 0.01$), underscoring its role in facilitating AI integration. **Implications for research and Practice.** Future implications suggest a growing reliance on AI, necessitating targeted PD programs, policy adaptations, and ethical guidelines to ensure equitable AI implementation. Without intervention, disparities in AI adoption could exacerbate educational inequalities, limiting the effectiveness of AI-driven learning Addressing barriers through structured training and transparent policies will be critical in maximizing AI's potential for enhancing pedagogical practices and student engagement in diverse educational settings.

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Introduction

Artificial intelligence (AI) has emerged as a transformative force in contemporary educational systems, reshaping pedagogical practices, assessment processes, and institutional decision-making worldwide. Since its early applications in computer-assisted instruction and rule-based tutoring systems, AI in education has evolved toward data-driven, adaptive technologies capable of supporting personalized learning, automated feedback, and predictive analytics (Wong et al., 2023). Recent advances in machine learning, natural language processing, and generative AI have accelerated this transformation, positioning AI not merely as a supplementary instructional tool but as an integral component of educational infrastructures (Elstad & Eriksen, 2024; Maita et al., 2024).

The expanding integration of AI into educational settings is closely tied to evolving institutional norms and professional expectations. Educational systems increasingly emphasize efficiency, personalization, data-informed instruction, and digital competence as core standards for teaching practice (Sharma et al., 2024). Within this context, teachers are expected to adopt AI tools while simultaneously exercising professional judgment regarding their pedagogical relevance, ethical implications, and alignment with curricular objectives. As a result, trust in AI technologies has become a critical condition for sustainable adoption, influencing whether teachers perceive AI as a supportive pedagogical partner or as a disruptive force that threatens professional autonomy and instructional integrity (Lucas et al., 2024; Wong et al., 2023).

Research consistently demonstrates that teachers' adoption of AI is shaped by perceived ease of use, perceived usefulness, institutional support, and access to professional development (PD) opportunities (Ayanwale & Ndlovu, 2024). These factors align with the Technology Acceptance Model, which identifies ease of use as a central determinant of both trust and behavioral intention toward technology adoption (Davis, 1989). However, adoption is not uniform across educational contexts. Diffusion of Innovations Theory further suggests that the uptake of new technologies is mediated by compatibility with existing practices, perceived relative advantage, and the social systems within which educators operate (Ghimire & Edwards, 2024).

Disciplinary culture constitutes a particularly influential yet underexplored factor in shaping AI adoption. Science education traditionally emphasizes empirical inquiry, experimentation, and data analysis, creating a pedagogical environment that aligns closely with AI-supported tools such as simulations, intelligent tutoring systems, and automated data processing (Ayanwale et al., 2024). In contrast, language education is grounded in human interaction, communicative competence, and interpretive meaning-making, which may generate reservations regarding the appropriateness of AI for preserving authentic pedagogical relationships and communicative depth (Paliszkiewicz & Gołuchowski, 2024). These disciplinary differences suggest that trust and adoption of AI are not solely technological issues but are deeply embedded in subject-specific norms and pedagogical values.

The role of contextual and sociocultural conditions further complicates AI adoption processes. In minority and underrepresented educational contexts, such as Arab society in Israel, schools often operate under conditions of limited technological infrastructure, unequal access to professional development, and persistent digital divides (Milicevic et al., 2024). Teachers in these settings face dual pressures, aligning with national and global expectations for technological integration while addressing local educational needs, cultural norms, and resource constraints. Consequently, trust in AI cannot be assumed to develop uniformly, but rather emerges through interactions between institutional support, disciplinary expectations, and contextual realities (Mafara & Abdullahi, 2024).

Despite the growing body of international research on AI in education, empirical studies examining trust and adoption of AI among teachers in Arab educational contexts remain limited. Existing literature has largely focused on higher education or majority populations, leaving a gap in understanding how AI is perceived and adopted by secondary school teachers working within culturally and structurally distinct environments (Shwedeh et al., 2024). Moreover, comparative analyses between disciplinary groups, particularly science and language teachers, are scarce, despite evidence that subject culture significantly shapes technology-related beliefs and practices (Ayanwale et al., 2024; Bai, 2024).

In response to these gaps, the present study investigates the relationship between perceived ease of use and trust in AI tools, compares adoption levels between science and language teachers, and examines the predictive role of professional development in AI adoption among secondary school teachers in Arab society in Israel. By situating AI adoption within its historical development, institutional norms, disciplinary cultures, and sociocultural conditions, this study seeks to strengthen the theoretical robustness of AI adoption research and to provide context-sensitive insights that can inform policy, professional development design, and equitable implementation of AI in secondary education.

Specifically, this research investigates the relationship between the perceived ease of use of AI tools and the level of trust that language and science teachers have in them. It compares the adoption rates of AI tools among language and science teachers in secondary schools within the Arab society in Israel. The study also assesses how professional development (PD) and training influence these adoption rates while considering teaching discipline and years of experience. The three guiding research questions are:

1. How does perceived ease of use relate to teachers' trust in AI tools?
2. What are the differences in AI tool adoption rates between language and science teachers?
3. To what extent do PD and training predict AI tool adoption rates, controlling for teaching discipline and experience?

Beyond its technological dimension, the choice to investigate trust and adoption of artificial intelligence in education is grounded in concrete curricular, professional, and policy-related requirements that increasingly shape contemporary teaching practice. Many secondary school curricula now explicitly emphasize digital literacy, data-informed instruction, and the responsible use of emerging technologies as core learning outcomes, thereby placing new expectations on teachers' instructional competencies (Ma & Lei, 2024;

Sharma et al., 2024). At the same time, teacher qualification frameworks increasingly require educators to demonstrate not only technical proficiency but also pedagogical judgment in integrating AI tools in ways that support learning goals, assessment integrity, and ethical standards (Lucas et al., 2024; Wong et al., 2023). Educational policies and strategic initiatives further promote AI adoption as a means of enhancing personalization, efficiency, and equity, while simultaneously calling for transparency, accountability, and professional oversight (Shwedeh et al., 2024).

From a pedagogical perspective, the significance of this issue lies in the need to reconcile technological innovation with foundational educational principles. Philosophically, the integration of AI raises questions about the role of the teacher, the nature of pedagogical authority, and the balance between automation and human judgment in teaching and learning. Trust in AI thus becomes not merely a technical condition but a pedagogical one, shaping whether AI functions as a supportive instructional partner or as a mechanism that undermines relational, dialogic, and meaning-centered aspects of education (Paliszkiewicz & Gołuchowski, 2024). By examining trust and adoption through this pedagogical lens, the present study addresses a critical educational concern: how AI can be integrated in ways that align with curricular goals, respect teachers' professional expertise, and preserve the pedagogical values that underpin effective teaching and learning.

Literature review and theoretical framework

Theoretical Frameworks and Models

A growing body of empirical research has examined teachers' adoption of artificial intelligence in educational settings, highlighting trust, perceived ease of use, and professional development as central predictors of implementation. Quantitative studies grounded in the Technology Acceptance Model consistently demonstrate that perceived ease of use significantly predicts both trust in AI systems and teachers' behavioral intentions to adopt them (Wong et al., 2023). For example, Sharma et al. (2024), in a large-scale survey of higher education instructors, found that ease of use was among the strongest predictors of AI acceptance, indirectly influencing adoption through increased trust and perceived pedagogical value. These findings provide direct empirical support for the assumption underlying the first research objective of the present study, namely that ease of use and trust are closely interrelated in shaping teachers' engagement with AI tools.

Empirical evidence also suggests that AI adoption varies across disciplinary contexts. Ayanwale et al. (2024), using structural equation modeling among STEAM teachers, reported higher levels of trust and adoption intentions among educators in scientifically oriented disciplines compared to those in language-based or humanities fields. Similarly, Chen et al. (2023) found that teachers working in data-intensive subjects demonstrated greater openness toward AI-supported instructional tools, attributing this pattern to alignment between disciplinary practices and AI functionalities such as analytics, simulations, and automated feedback. These findings are directly relevant to the second research objective of the current study, which examines differences in AI adoption between science and language teachers, and they provide empirical justification for hypothesizing higher adoption levels among science educators.

Professional development has been repeatedly identified as a key empirical predictor of AI adoption in education. Lucas et al. (2024), in a quantitative study of secondary school teachers, showed that targeted training in AI tools significantly increased both trust and classroom use, even after controlling for digital competence and teaching experience. Similarly, Ma and Lei (2024) found that teacher education students' willingness to adopt AI technologies was strongly predicted by exposure to structured training and institutional support. These findings align closely with Diffusion of Innovations Theory, which emphasizes the role of knowledge acquisition and trialability in technology uptake (Ghimire & Edwards, 2024). Collectively, this empirical evidence provides a strong foundation for the third hypothesis of the present study, which examines the predictive role of professional development and training in AI adoption while controlling for teaching discipline and experience.

Importantly, recent empirical studies highlight the role of contextual and sociocultural conditions in shaping trust and adoption of AI. Research conducted in under-resourced or minority educational contexts indicates that limited infrastructure, unequal access to professional development, and institutional ambiguity regarding AI policies can significantly constrain adoption, even when teachers hold positive attitudes toward technology (Milicevic et al., 2024). Mafara and Abdullahi (2024) further demonstrated that ethical concerns, including data privacy and algorithmic bias, disproportionately affect trust in AI among teachers operating in contexts with weaker regulatory frameworks. These findings underscore the importance of examining AI adoption within specific sociocultural settings, thereby reinforcing the relevance of focusing on Arab secondary schools in Israel as the context of the current study.

Taken together, existing empirical research establishes that teachers' trust in AI, perceived ease of use, disciplinary affiliation, and access to professional development are interrelated factors shaping AI adoption. However, there remains a notable gap in empirical studies that simultaneously examine these variables within secondary education and within Arab minority contexts. The present study addresses this gap by empirically testing these relationships among science and language teachers, thereby extending existing research and providing context-sensitive evidence to inform policy and practice.

AI in Education

Historical Development of AI in Education

The evolution of AI in education has significantly shaped its current and future applications. In the 1960s, early computer-assisted instruction provided personalized learning experiences (Al-Momani & Ramayah, 2024). The 1970s and 1980s saw the development of intelligent tutoring systems (ITS) that utilized AI to simulate one-on-one tutoring, diagnose errors, and offer feedback (Bai, 2024; Skarzyńska, 2024).

By the 1990s, AI tools integrated multimedia, simulations, and machine learning, enabling systems to improve over time (Neumann et al., 2022). The 2000s introduced data mining and adaptive learning, providing personalized recommendations and fostering AI-supported peer collaboration (Kuberkar et al., 2022).

Recent advances in deep learning and neural networks have enhanced predictive

models and intelligent agents for applications like automated grading and virtual assistants (Chen et al., 2023). AI continues to bridge technological advancements and pedagogical innovation, enhancing inclusive learning environments (Milicevic et al., 2024).

AI in Science Education

Benefits and Applications of AI in Science Teaching

The integration of AI in science teaching enhances both instruction and learning. A key benefit is personalized learning, where AI analyzes student data to tailor instruction, improving engagement by aligning with individual learning paces (Tarisayi, 2024).

Intelligent tutoring systems (ITS) provide real-time feedback, diagnose errors, and offer explanations, thereby supporting problem-solving and critical thinking —essential skills for mastering scientific concepts (Bai, 2024; Skarzyńska, 2024).

Virtual laboratories enable cost-effective experimentation, making experiential learning accessible to institutions with limited physical labs. These tools allow the exploration of complex scientific phenomena beyond traditional settings (Karran et al., 2025; Neumann et al., 2022).

AI enhances data analysis and visualization by processing large datasets to improve data literacy and support educators in identifying performance patterns (Kuberkar et al., 2022). Additionally, AI-powered platforms facilitate collaboration, manage group projects, and provide feedback, thereby strengthening teamwork skills (Ghimire & Edwards, 2024).

Challenges and Barriers to AI Adoption by Science Teachers

AI adoption in science education faces multiple challenges. A significant issue is the lack of training and professional development (PD), which leaves educators without the necessary skills to use AI tools effectively (Al-Momani & Ramayah, 2024). Many teachers hesitate due to AI's technical complexity, limiting adoption (Tarisayi, 2024).

Limited technological infrastructure is another barrier, particularly in underfunded schools lacking essential hardware, internet access, and software licenses for AI tools(Shwedeh et al., 2024).

AI integration also raises concerns about data privacy and security, necessitating robust protection policies to build trust among educators, students, and parents (Neumann et al., 2022).

Curriculum alignment remains a challenge, as AI tools must be integrated into lesson plans to enhance learning (Mafara & Abdullahi, 2024). Resistance to traditional teaching preferences further slows adoption (Chen et al., 2023). Ethical concerns, including bias and equity, must also be addressed (Neumann et al., 2022).

AI in Language Education

AI Tools for Language Learning and Assessment

AI tools have transformed language learning and assessment by offering personalized instruction and efficient feedback. Intelligent tutoring systems (ITS) use natural language processing to engage learners in real-time, adapting exercises to their proficiency in grammar, vocabulary, pronunciation, and comprehension (Ayanwale & Ndlovu, 2024). By providing immediate feedback, ITS accelerates learning (Skarzyńska, 2024).

Automated essay scoring (AES) employs machine learning to evaluate writing, grading coherence, cohesion, and grammar while reducing teachers' workload (Shwedeh et al., 2024). AES ensures consistent grading, identifies common errors, and suggests targeted exercises to improve writing (Paliszkiewicz & Gołuchowski, 2024).

AI-powered language applications, such as chatbots and virtual assistants, simulate real-life conversations, thereby improving fluency and listening skills (Neumann et al., 2022). These applications also offer personalized study plans, reminders, and pronunciation feedback (Lucas et al., 2024).

AI enhances language learning by making instruction more adaptive, interactive, and inclusive (Neumann et al., 2022).

Language Teachers' Perceptions of AI Integration

Language educators are optimistic yet cautious about AI integration. While AI offers individualized instruction and immediate feedback (Wong et al., 2023), concerns persist about the reduction of human interaction, which is essential for adapting pedagogy in real-time (Paliszkiewicz & Gołuchowski, 2024). Data privacy and security are also key issues, requiring clear policies and ethical safeguards (Maita et al., 2024).

Teachers adopt AI when it is reliable, intuitive, and improves outcomes (Ayanwale et al., 2024). Positive experiences drive acceptance, while technical issues foster skepticism (Karran et al., 2025). Perceptions depend on training, personalization, and trust in AI's role alongside human educators (Kuberkar et al., 2022).

Comparative Analysis of AI Use in Language vs. Science Education

A comparative analysis highlights the distinct applications of AI in language versus science education. In language learning, AI supports speaking, listening, reading, and writing through natural language processing (NLP), offering real-time feedback on pronunciation, grammar, and vocabulary for personalized learning (Ayanwale & Ndlovu, 2024; . AI-driven tools simulate conversations, improving fluency, while automated essay scoring (AES) enhances writing with immediate feedback (Skarzyńska, 2024).

AI focuses on problem-solving, data analysis, and experimental learning in the field of science education. Intelligent tutoring systems (ITS) provide step-by-step guidance, adapting to learners' needs in subjects that require procedural knowledge, such as math and physics (Paliszkiewicz & Gołuchowski, 2024).

A key distinction lies in the assessment approach. AI in language education emphasizes formative assessment, offering ongoing feedback to refine skills (Mafara & Abdullahi, 2024). In contrast, science education primarily utilizes summative assessments, testing comprehension through complex problem-solving tasks (Bai, 2024).

AI serves different pedagogical roles: in language education, it supplements human instruction with personalized practice, while in science education, it is integral to curricula, promoting inquiry-based learning (Karran et al., 2025).

Trust and Adoption of AI by Educators

Factors Influencing Trust in AI among Teachers

Teachers' trust in AI depends on its reliability, transparency, and consideration of ethical implications. Reliable AI tools that consistently grade, provide accurate feedback, and enhance engagement foster trust, while errors undermine confidence, emphasizing the need for robust systems (Skarzyńska, 2024; Tarisayi, 2024).

Transparency is crucial. Educators must understand how AI algorithm's function and process data to integrate them effectively (Shwedeh et al., 2024). Clear explanations of AI decision-making increase confidence and control (Chen et al., 2023).

Ethical concerns, such as data privacy and bias, influence trust. AI systems with strong encryption and transparent data policies build confidence (Milicevic et al., 2024).

Professional development (PD) bridges the gap between technology and pedagogy, empowering educators (Chen et al., 2023). Institutional support through policies, resources, and collaboration further strengthens trust in AI integration (Mafara & Abdullahi, 2024).

Adoption Levels of AI in Different Educational Contexts

Professional development (PD) fosters trust in AI by equipping teachers with essential skills and bridging the gap between technology and pedagogy (Chen et al., 2023) . Institutions offering comprehensive training and support see higher AI adoption, enabling educators to integrate AI with confidence (Ayanwale & Ndlovu, 2024).

School leadership and policymakers play a key role. Strong commitment to AI policies enhances teachers' confidence in AI tools (Ma & Lei, 2024; Mafara & Abdullahi, 2024).

AI adoption varies globally. Developed regions, such as the US, China, and Europe, invest in intelligent tutoring, automated grading, and virtual learning (Ghimire & Edwards, 2024). In contrast, parts of Africa and South Asia face limited internet, funding, and trained personnel (Karran et al., 2025).

Institutional priorities also shape AI use. STEM-focused schools favor the use of AI for hands-on learning, while humanities-focused institutions emphasize language learning applications (Chen et al., 2023). Expanding access to AI can enhance personalized learning worldwide (Maita et al., 2024; Milicevic et al., 2024).

Strategies to Enhance Trust and Adoption of AI

Enhancing trust and adoption of AI in education requires addressing both technical and human factors. Ensuring reliability and transparency is crucial. Educators require clear explanations of AI operations, including data usage and decision-making processes (Ayanwale et al., 2024). Comprehensive documentation, user manuals, and training sessions can help demystify AI (Bai, 2024).

Ongoing training and support equip teachers to effectively integrate AI. Programs should address specific needs, offering hands-on classroom experiences (Ghimire & Edwards, 2024).

Ethical considerations such as data privacy, security, and fairness must be prioritized. Clear policies and safeguards help build trust among educators, students, and parents (Ayanwale & Ndlovu, 2024).

Pilot programs and case studies demonstrate the benefits of AI, boosting confidence, showcasing improved teaching efficiency, and enhanced student engagement (Chen et al., 2023).

Institutional support and leadership through resource allocation, training, and policy advocacy are essential for widespread AI adoption (Maita et al., 2024; Milicevic et al., 2024).

Methodology

Research design

Correlational quantitative research method is commonly used in educational research to examine relationships among variables using numerical data without manipulation. This approach is ideal for studying the adoption and trust levels of AI tools among language and science teachers in secondary schools within the Arab society in Israel.

Researchers utilize statistical techniques to assess the strength and direction of these relationships, focusing on variables such as perceived ease of use, trust in AI, adoption levels, professional development, teaching subject, and years of experience. The method's strength lies in its ability to handle large data volumes, thereby enhancing the generalizability of the findings.

This method also enables sophisticated statistical analyses, such as regression analysis, to predict the influence of factors like professional development on adoption levels. Furthermore, it respects the natural educational environment, ensuring that findings accurately reflect current practices and attitudes.

The correlational approach can identify differences between groups, using techniques such as t-tests to explore disparities in AI adoption between language and science teachers. It enables the simultaneous examination of multiple variables, providing insights into complex interrelationships.

In summary, the correlational quantitative research method is best suited for investigating AI adoption and trust among high school teachers within the Arab society in Israel, as it effectively explores natural variable relationships, supports large samples, and

utilizes robust analyses.

Participants and sample

The current study involved 120 teachers, evenly split between 60 science teachers and 60 language teachers from Arab schools in northern Israel. Researchers used convenience sampling to access this population efficiently within a limited timeframe. This approach allowed the recruitment of willing participants directly from the schools, ensuring a manageable and representative sample. While this approach provided valuable access to a relevant teacher population, future research would benefit from stratified random sampling to enhance generalizability and minimize sampling bias. Including teachers from rural, urban, and mixed schools can yield more nuanced insights into AI adoption trends across varying contexts. It facilitated the collection of relevant data on teachers' adoption and trust in AI tools, offering insights into the local educational context. The findings may lay the groundwork for future research using more randomized sampling methods for broader applicability.

Data collection methods

The research process for this study was designed to be efficient and accessible, utilizing Google Forms to deliver the questionnaire to the participants. This online survey method facilitated the easy distribution and collection of responses from the 120 teachers, ensuring a streamlined data-gathering process. The questionnaire included demographic information and two statements to assess perceived ease of use and trust in AI tools. Participants were provided with a link to the Google Form, allowing them to complete the survey at their convenience, thereby ensuring high response rates and accurate data capture. This approach minimized logistical challenges and enabled real-time monitoring and follow-up with participants to ensure completeness and accuracy of the responses.

Research instrument

The three questionnaires primarily utilized to collect data included one demographic data questionnaire comprising questions regarding gender, age, seniority in teaching, teaching profession, participation in PD training, family status, economic status, and religiosity. Table 1 summarizes this demographic data questionnaire

Table 1

Demographic data questionnaire

Demographic Information	Response Options
Gender	Male / Female
Age (in years)	[Open response]
Seniority in teaching (in years)	[Open response]
Teaching profession	Science / Language
PD and training in AI tools	Yes / No
Marital status	Single / Married / Other
Economic situation	Below average / Around average / Above average

Level of religiosity	Secular / Traditional / Religious

The second questionnaire, "Perceived Ease of Use of AI Tools Questionnaire," was based on the Technology Acceptance Model (TAM) by Davis (1989), which has been widely used to evaluate the perceived ease of use of technology, particularly in education. The questionnaire comprised 10 items that assessed educators' views on learning and using AI tools in their teaching. Respondents rated statements on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The TAM's perceived ease of use demonstrated high reliability, with Cronbach's alpha values consistently exceeding 0.90. It was supported by various studies for its construct and content validity, confirming its relevance in educational technology contexts. Table 2 enlists the statement of this Perceived Ease of Use of AI Tools Questionnaire.

Table 2

Perceived Ease of Use of AI Tools Questionnaire

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. AI tools are easy to learn.	1	2	3	4	5
2. I find AI tools easy to use in my teaching.	1	2	3	4	5
3. AI tools make my teaching tasks simpler.	1	2	3	4	5
4. The interface of AI tools is user-friendly.	1	2	3	4	5
5. I can easily integrate AI tools into my teaching practices.	1	2	3	4	5
6. AI tools require minimal effort to use effectively.	1	2	3	4	5
7. Instructions for using AI tools are clear and understandable.	1	2	3	4	5
8. I can quickly become skillful at using AI tools.	1	2	3	4	5
9. I find it straightforward to troubleshoot problems with AI tools.	1	2	3	4	5
10. Overall, AI tools are convenient to use in the classroom.	1	2	3	4	5

The third questionnaire, "Level of Trust in AI Tools Questionnaire" was based on a trust in technology framework by McKnight et al. (2002) and was used to assess teachers' trust in AI tools in education. It comprised 10 items that evaluated trust dimensions such as reliability, dependability, and accuracy of AI tool performance, with participants rating their agreement on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire demonstrates high internal consistency, with Cronbach's alpha values exceeding 0.85. It has been validated in educational contexts, confirming its effectiveness in measuring trust in AI tools through comprehensive empirical research that addresses aspects such as reliability, competence, and integrity. Table 3 depicts the statement of this Perceived Ease of Use of AI Tools Questionnaire.

Table 3

Level of Trust in AI Tools Questionnaire

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I trust AI tools to enhance student learning outcomes.	1	2	3	4	5
2. AI tools provide reliable assistance in teaching.	1	2	3	4	5
3. I believe AI tools are beneficial for educational purposes.	1	2	3	4	5

Table 3(continued)

Level of Trust in AI Tools Questionnaire

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. I trust the feedback provided by AI tools.	1	2	3	4	5
5. AI tools are dependable in performing their tasks.	1	2	3	4	5
6. I feel confident using AI tools in my classroom.	1	2	3	4	5
7. I trust AI tools to support my teaching effectively.	1	2	3	4	5
8. AI tools are trustworthy for providing accurate information.	1	2	3	4	5
9. I have confidence in the overall performance of AI tools.	1	2	3	4	5
10. I trust AI tools to be a valuable resource in education.	1	2	3	4	5

Data analysis procedure

The data analysis utilized SPSS version 29 software for complex statistical analyses. A Pearson correlation analysis was conducted to examine the relationship between teachers' perceived ease of use of AI tools and their trust in them. An independent samples t-test was performed to determine the differences in AI tool adoption between language and science teachers. Additionally, a multiple regression analysis assessed how professional development (PD) and AI tool training predicted high school teachers' adoption levels while controlling teaching subjects and years of experience. These analyses provided valuable insights into factors influencing AI adoption and trust among teachers.

Results

This section presents the empirical findings of the study examining demographic analysis of 120 participants, teachers perceived ease of use of AI tools, trust in AI, and levels of AI adoption among science and language teachers in Arab secondary schools in Israel. All analyses were conducted using SPSS version 29.

Table 4 provides a demographic analysis of 120 participants, equally divided between 60 science and 60 language teachers. The science group shows an equal male-to-female ratio, while 66.7% of language teachers are female. The mean age for science teachers is 38.5 years (SD 7.2), and for language teachers, it is 40.3 years (SD 8.1). Science teachers have an average of 12.7 years of experience (SD 5.4), compared to 14.1 years (SD 6.3) for language teachers. Regarding AI training, 66.7% of science teachers have received it, while 40% of language teachers have. Regarding marital status, 66.7% of science teachers are married, 26.7% single, and 6.7% 'other,' versus 50%, 40%, and 10%, respectively, for language teachers. Economic perceptions show that 66.7% of science teachers view their status as average, while for language teachers, it is 60%. Lastly, regarding religiosity, 50% of science teachers identify as traditional, 33.3% as secular, and 16.7% as religious, compared to 43.3%, 40%, and 16.7%, respectively, for language teachers.

Table 4

Demographic Background of Participants

Variables and Categories	Science Teachers (N=60)	Language Teachers (N=60)
Gender		
Male	30 (50%)	20 (33.3%)
Female	30 (50%)	40 (66.7%)
Age (in years)	38.5 ± 7.2	40.3 ± 8.1
Seniority in Teaching (in years)	12.7 ± 5.4	14.1 ± 6.3
PD and Training in AI		
Yes	40 (66.7%)	24 (40%)
No	20 (33.3%)	36 (60%)
Marital Status		
Single	16 (26.7%)	24 (40%)
Married	40 (66.7%)	30 (50%)
Other	4 (6.7%)	6 (10%)
Economic Situation		
Below Average	10 (16.7%)	16 (26.7%)
Around Average	40 (66.7%)	36 (60%)
Above Average	10 (16.7%)	8 (13.3%)
Level of Religiosity		
Secular	20 (33.3%)	24 (40%)
Traditional	30 (50%)	26 (43.3%)
Religious	10 (16.7%)	10 (16.7%)

Descriptive Statistics and Reliability

Descriptive statistics for the main study variables are presented in Table 5. Perceived ease of use of AI tools yielded a mean score of 3.87 (SD = 0.65), indicating relatively high

perceived usability among teachers. Trust in AI tools had a mean score of 3.65 (SD = 0.70), while AI adoption levels showed a mean score of 3.45 (SD = 0.75), reflecting moderate levels of use. Internal consistency reliability was high for all scales, with Cronbach's alpha coefficients ranging from .87 to .91.

Table 5

Central tendency and variability of the key variables

Variable	Mean	Standard Deviation	Data Range	Reliability (Cronbach's Alpha)
Perceived Ease of Use of AI Tools	3.87	0.65	2.5 - 5.0	0.91
Level of Trust in AI Tools	3.65	0.70	2.0 - 5.0	0.89
Adoption Levels of AI Tools	3.45	0.75	2.0 - 5.0	0.87

Relationship Between Perceived Ease of Use and Trust in AI

To examine the relationship between perceived ease of use of AI tools and trust in AI, a Pearson correlation analysis was conducted. The analysis revealed a strong positive correlation between perceived ease of use and trust in AI ($r = .65$, $p < .01$). Higher perceived ease of use was associated with higher levels of trust in AI tools among teachers.

Differences in AI Adoption Between Science and Language Teachers

An independent samples t-test was performed to examine differences in AI adoption levels between science and language teachers. Results indicated a statistically significant difference between the two groups, $t(118) = -2.15$, $p = .036$. Science teachers reported higher levels of AI adoption ($M = 3.65$, $SD = 0.80$) compared to language teachers ($M = 3.25$, $SD = 0.65$).

Predictors of AI Adoption

A multiple regression analysis was conducted to assess whether professional development and training in AI tools predicted AI adoption levels while controlling teaching subjects and years of experience. AI adoption served as the dependent variable. The regression model was statistically significant and accounted for 45% of the variance in AI adoption ($R^2 = .45$).

Professional development and AI training emerged as a significant predictor of AI adoption ($B = 0.45$, $\beta = .50$, $p < .01$). Teaching subject also contributed significantly to the model ($B = 0.30$, $\beta = .35$, $p < .05$). Years of teaching experience did not significantly predict AI adoption ($B = 0.05$, $\beta = .15$, $p > .05$).

Discussion

The present study examined teachers' trust in artificial intelligence and its adoption among science and language teachers in Arab secondary schools in Israel. The findings demonstrate a strong positive relationship between perceived ease of use and trust in AI

tools, significant differences in adoption levels between disciplinary groups, and a substantial predictive role of professional development in AI adoption. These results align with and extend existing empirical research on technology acceptance in educational contexts.

Although the study addresses teachers' perceptions of trust and adoption of artificial intelligence, the findings extend beyond descriptive perspectives and provide empirically grounded implications. The statistically significant relationships identified in the Results section demonstrate that trust in AI and adoption are not abstract attitudes but are systematically associated with measurable factors such as perceived ease of use, disciplinary affiliation, and professional development. These relationships indicate that teachers' perspectives translate into concrete behavioral patterns of technology use, thereby underscoring the analytical contribution of the study.

The strong association between perceived ease of use and trust suggests that trust functions as an operational mechanism that mediates teachers' engagement with AI tools. Similar empirical patterns have been reported in prior quantitative studies, which demonstrated that ease of use indirectly predicts adoption through trust and perceived instructional control (Al-Momani & Ramayah, 2024; Lucas et al., 2024). The present findings reinforce these conclusions within the context of secondary education and extend them to Arab schools in Israel, a population that has been underrepresented in previous empirical research.

Furthermore, the observed disciplinary differences in AI adoption highlight that teachers' perspectives are embedded within pedagogical and epistemological traditions. Empirical research has shown that science teachers are more likely to adopt AI tools due to their alignment with inquiry-based learning, data analysis, and experimentation, whereas language teachers tend to express greater hesitation due to concerns regarding interaction, authenticity, and pedagogical control (Ayanwale et al., 2024). The current study empirically confirms these patterns and demonstrates that disciplinary culture operates as a significant predictor rather than a purely theoretical assumption.

Importantly, the predictive role of professional development provides a clear analytical implication of the study's results. The regression analysis indicates that structured training is not merely a contextual background factor but a statistically significant driver of AI adoption. This finding is consistent with previous empirical studies showing that professional development enhances teachers' technological self-efficacy and reduces uncertainty toward AI-supported instruction (Ma & Lei, 2024; Sharma et al., 2024). The present study contributes additional evidence that professional development may function as a compensatory mechanism, particularly for teachers in disciplines or contexts where initial trust in AI is lower.

Taken together, these findings demonstrate that the study does not merely document perspectives but offers an empirical analysis of how trust, disciplinary context, and institutional support shape AI adoption in practice. By linking teachers' reported perceptions to statistically significant outcomes, the study provides actionable implications for curriculum design, teacher education, and policy development, rather than remaining at a conceptual or attitudinal level.

The strong association between perceived ease of use and trust supports prior research grounded in the Technology Acceptance Model, which consistently identifies ease of use as a central determinant of trust and behavioral intention toward educational technologies (Al-Momani & Ramayah, 2024; Davis, 1989). Similar empirical patterns were reported by Sharma et al. (2024) and Lucas et al. (2024), who found that teachers are more likely to trust and use AI tools when they perceive them as intuitive and manageable within existing instructional routines. The current findings extend this evidence to Arab secondary school contexts, suggesting that usability remains a critical trust-building factor across diverse educational settings.

The observed difference in AI adoption between science and language teachers is consistent with previous studies indicating that disciplinary culture influences technology uptake. Empirical research has shown higher adoption rates among teachers in scientifically oriented disciplines, where AI tools align more closely with data-driven inquiry and analytical practices (Ayanwale et al., 2024). In contrast, language educators often express greater concern regarding the potential impact of AI on interpersonal interaction and communicative authenticity (Paliszkiewicz & Gołuchowski, 2024). The present findings corroborate these disciplinary patterns and highlight the importance of subject-specific considerations when implementing AI in schools.

The significant predictive role of professional development and training in AI adoption is in line with previous empirical evidence emphasizing the importance of structured learning opportunities in fostering meaningful technology integration. Studies by Ma and Lei (2024) and Lucas et al. (2024) demonstrated that targeted professional development enhances teachers' confidence, trust, and practical use of AI tools. The current findings reinforce these conclusions and further suggest that professional development may mitigate disciplinary disparities in AI adoption by equipping teachers with relevant pedagogical and technical competencies.

Finally, the findings should be interpreted within the sociocultural context of Arab secondary education in Israel, where institutional support, infrastructure limitations, and access to training may shape teachers' engagement with AI technologies. Prior research indicates that contextual constraints can moderate technology adoption even when attitudes are favorable (Milicevic et al., 2024). By empirically examining trust and adoption within this context, the present study contributes context-sensitive evidence that complements existing international research and underscores the need for equitable, culturally responsive AI implementation strategies.

The findings of the present study demonstrate a high degree of consistency with prior empirical research on artificial intelligence adoption in education. The strong association identified between perceived ease of use and trust in AI aligns closely with previous studies reporting that usability is a central mechanism through which trust and adoption intentions are formed among educators (Al-Momani & Ramayah, 2024; Lucas et al., 2024). Across these studies, ease of use consistently emerged as a robust predictor of teachers' willingness to engage with AI tools, suggesting that the current findings corroborate rather than diverge from established empirical patterns.\

Similarly, the higher adoption levels observed among science teachers are consistent with earlier research indicating that teachers in scientifically oriented and data-driven

disciplines tend to report greater openness to AI-supported instructional practices (Chen et al., 2023). These studies attribute disciplinary differences to epistemological alignment between AI functionalities and inquiry-based pedagogies, a pattern that is empirically confirmed by the current results. In contrast, the relatively lower adoption among language teachers mirrors prior findings highlighting concerns related to interaction, pedagogical authenticity, and instructional control in language education contexts (Elstad & Eriksen, 2024).

The significant predictive role of professional development in the present study further reinforces the consistency of the findings with existing empirical evidence. Previous quantitative studies have repeatedly shown that structured training and institutional support enhance teachers' confidence, trust, and sustained use of AI technologies (Ma & Lei, 2024; Sharma et al., 2024). The current results extend these conclusions by demonstrating that professional development remains a strong predictor of AI adoption even when disciplinary affiliation and teaching experience are considered. Taken together, these consistencies indicate that the findings of the present study are well aligned with the broader empirical literature, while also contributing context-specific evidence from Arab secondary schools in Israel.

Conclusion

The present study investigated trust in artificial intelligence and the adoption of AI practices among science and language teachers in Arab secondary schools in Israel. By examining the relationships between perceived ease of use, trust in AI, disciplinary affiliation, and professional development, the study provides empirical evidence that teachers' engagement with AI is shaped by both technological and contextual factors. The findings indicate that perceived ease of use is strongly associated with trust in AI tools, that science teachers demonstrate higher levels of AI adoption than language teachers, and that professional development plays a significant predictive role in fostering AI adoption. Together, these results highlight the importance of usability, disciplinary context, and institutional support in shaping meaningful and sustainable integration of AI in secondary education.

Several limitations should be acknowledged when interpreting the findings of this study. First, the use of convenience sampling limits the generalizability of the results beyond the specific population examined. Although the sample provided valuable insights into Arab secondary schools in Israel, future studies should employ stratified or random sampling methods to enhance representativeness. Second, the study relied on self-report questionnaires, which may be subject to social desirability bias and may not fully capture actual classroom practices. Third, the cross-sectional research design does not allow for causal inferences regarding the relationships between trust, ease of use, professional development, and AI adoption. Longitudinal designs would be necessary to examine changes in teachers' perceptions and practices over time.

Future research should extend this work by employing longitudinal and mixed methods designs to examine how trust in AI and adoption patterns evolve as teachers gain increased exposure and experience with AI tools. Qualitative approaches, such as interviews or classroom observations, could provide deeper insight into teachers' decision-

making processes and the pedagogical challenges they encounter when integrating AI. Additionally, future studies should explore the role of institutional policies, leadership support, and ethical considerations in shaping AI adoption. Expanding the research to include diverse geographic regions, educational levels, and sociocultural contexts would further contribute to a more comprehensive understanding of AI integration in education.

The findings of this study have important implications for both research and educational practice. From a research perspective, the results underscore the need to examine AI adoption through multidimensional frameworks that integrate technological, disciplinary, and contextual factors. For practice, the study highlights the critical role of targeted professional development in promoting trust and effective use of AI tools. Educational policymakers and school leaders should prioritize the development of discipline-specific training programs that address both technical skills and pedagogical integration. Moreover, ensuring equitable access to AI resources and professional learning opportunities is essential for reducing adoption gaps across subjects and contexts. By fostering supportive institutional environments and user-friendly AI systems, schools can enhance teachers' confidence and maximize the pedagogical potential of AI technologies.

Declarations

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Ethics Approval and Consent to Participate. This research involved anonymized survey data from students and did not require formal ethics approval under institutional guidelines.
Consent for Publication. Not applicable.
Availability of Data and Materials. The data and materials supporting this study's findings are available upon request.
Authors' Contributions. Prof. Dr. Muhamad Hugerat led the study's design, supervised the research project, guided the study, and contributed to the manuscript's conceptualization and manuscript revision. All other authors contributed equally to the conception, design, data collection, analysis, and writing of this manuscript. All authors read and approved the final version of the manuscript.

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