



# Friend, tool, or threat? High school students' and teachers' perspectives on AI in learning

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## ABSTRACT

Artificial Intelligence (AI) is increasingly embedded in secondary education, yet its impact on high school students and teachers remains underexplored. This study employed a sequential explanatory mixed-methods design to investigate AI adoption, attitudes, and concerns among 545 students and 24 teachers in Kashmir, India. Quantitative results, grounded in the Technology Acceptance Model and Sociocultural Learning Theory, showed that sociocultural and self-perceived learning emerged as the strongest predictors of positive attitudes, followed by ease of use and usefulness, while ethical concerns had a minor negative influence. Qualitative interviews revealed optimism about AI's potential but highlighted risks related to plagiarism, over-reliance, and assessment authenticity. Findings point to the need for AI literacy, ethical training, and clear institutional policies to guide responsible integration. This study contributes one of the first comprehensive accounts of adolescent and teacher perspectives on AI in high school learning, offering evidence-based recommendations for pedagogy and policy.

## ARTICLE HISTORY

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## KEYWORDS

Artificial intelligence; high school students; technology acceptance model; sociocultural learning theory; student attitudes

## Introduction

Over the past few years, Generative Artificial Intelligence (GenAI) applications have rapidly reshaped the educational landscape, transforming how students access, process, and present knowledge. Conversational AI tools such as ChatGPT, DeepSeek, and Gemini, along with productivity tools like Canva AI, QuillBot, and Grammarly, are increasingly embedded in students' daily academic practices (Dovgyi et al., 2024; Druga et al., 2022; Ismailia & Novawan, 2025; Koltovskaia et al., 2024). These tools are freely accessible even through smartphones, and are widely perceived as convenient, user-friendly, and effective in supporting independent learning. They facilitate exam preparation, enhance writing and self-assessment skills, and provide immediate, personalized feedback that extends beyond traditional classroom instruction (Reiter et al., 2025; Sol et al., 2024; von Garrel & Mayer, 2023; Wood & Moss, 2024).

AI is not confined to higher education; it is rapidly gaining traction in secondary schools worldwide. Irrespective of age or curriculum, the proliferation of AI-generated tools across the educational system underscores the technology's growing influence. However, research indicates that high school students' awareness of AI often develops informally through social media, peer interactions, or family conversations rather than through structured instruction (Hingle & Johri, 2024). While this accessibility has promoted self-regulated learning, the largely unregulated and unsystematic use of AI in high schools raises critical questions about students' capacity to develop meaningful awareness without institutional guidance. In particular, the absence of formal training and ethical orientation renders the widespread use of AI in secondary education both promising and problematic.

Current empirical studies consistently show that high school students hold largely positive attitudes toward AI tools, adopting them extensively for assignments, projects, and homework (Fichten et al., 2022; Sok et al., 2025). As a digitally savvy generation, students are eager to experiment with emerging technologies, often valuing their convenience, speed, and accessibility without fully considering long-term academic and ethical implications (Zhai et al., 2024). While prior research emphasizes AI's potential to enhance personalized learning, formative assessment, and engagement (Bhatia et al., 2024; Tariq, 2025;

Yaseen et al., 2025), a more nuanced picture is emerging. A recent large-scale Hungarian survey found that 16% of secondary students used AI to complete written homework, particularly essays, but that adoption patterns varied according to gender and attitudes (Turós et al., 2025). Interestingly, although female students expressed more positive views toward AI in learning, they were less likely than males to use it for homework completion. Moreover, negative attitudes such as perceiving AI as dangerous were more strongly predictive of non-use than positive attitudes were of use. These findings suggest that student adoption of AI is shaped by access, convenience, and complex sociocultural and attitudinal factors.

On the one hand, AI offers substantial opportunities: adaptive systems can personalize learning pathways, predict performance, and promote equity across diverse backgrounds (Lata, 2024; Nguyen et al., 2023). AI applications have also been shown to support formative assessment, build self-confidence, and encourage differentiated instruction (Chiu et al., 2024; Mousa, 2025). On the other hand, researchers warn that overreliance may erode creativity, critical thinking, and problem-solving, while also increasing risks of plagiarism, blurred authorship, and ethical misuse (Balalle & Pannilage, 2025; Kovari, 2025; Pikhart & Al-Obaydi, 2025). These risks are echoed in recent findings from Cambodia, where students moderately agreed that AI use could threaten privacy and security, promote over-reliance, and lead to academic integrity issues, including plagiarism (Sol et al., 2024). Yet, compared to these ethical risks, students were less attentive to the danger of receiving false or biased responses or the possibility that AI might reduce higher-order skills such as problem-solving and creativity. This highlights the need for targeted AI literacy programs and policy frameworks in schools to ensure responsible and informed adoption.

Teachers face the added challenge of adapting traditional assessments to ensure authenticity and meaningful evaluation in AI-enhanced classrooms (Milano et al., 2023). The uneven effectiveness of AI across educational levels compounds the challenge. Meta-analyses show stronger benefits in higher education compared to secondary schooling (Wu & Yu, 2024), where younger students may lack the maturity to use AI responsibly. Moreover, despite a growing body of literature on AI in higher education, research on high school contexts remains scarce, particularly concerning the ethical, pedagogical, and attitudinal dimensions of AI use (Durall Gazulla et al., 2025; Fu & Weng, 2024). The Hungarian study underscores this gap, stressing the urgent need for curriculum development and AI literacy training in secondary schools.

The tension between maximizing AI's educational benefits and mitigating risks highlights the need for evidence-based integration strategies. Ulfert-Blank and Schmidt (2022) and Louis and ElAzab (2023) argue that AI should complement, not replace, traditional learning. Overuse undermines human intellectual development, while conscious, moderate use can foster self-directed learning and digital competence (Wu et al., 2024; Yavich, 2025). Thus, research into how high school students and teachers perceive, adopt, and regulate AI use is timely and essential.

## Theoretical background

The theoretical foundation of this study integrates two complementary frameworks to comprehensively understand how students adopt, use, and perceive AI-powered tools: Vygotsky's (1978) Sociocultural Learning Theory (SLT) and Davis's (1989) Technology Acceptance Model (TAM).

The Technology Acceptance Model emphasizes the role of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) in shaping students' attitudes toward technology adoption. In educational contexts, this model had been widely used to explain how students evaluate emerging tools, linking these perceptions to behavioral intention and actual use. However, the model has been widely critiqued for focusing mainly on individual cognitive appraisals while neglecting the broader cultural, emotional, and ethical factors that influence technology use in school settings.

In contrast, Sociocultural Learning Theory situates learning within cultural practices, social interactions, and institutional structures. From this perspective, AI-powered tools function as cultural mediators that extend students' capabilities within the zone of proximal development (ZPD). They support not only cognitive growth but also identity formation, belonging, and emotional well-being. For teachers, SLT highlights

how adoption is shaped by classroom norms, institutional policies, and the ethical frameworks within which learning takes place.

Bringing these perspectives together enables a more comprehensive account of AI use in high schools. In this framework, TAM, as extended in this study, explains the key individual appraisals (perceived usefulness, usability, and ethical concerns) that shape attitudes toward AI, while SLT describes the broader social context (peer learning, institutional readiness, and cultural narratives) that situates those attitudes. Together, these perspectives informed the study's research questions: RQ1 and RQ2 are grounded primarily in TAM, RQ3 extends TAM by integrating ethical concerns, and RQ4 – RQ5 reflect sociocultural dimensions by focusing on teachers' perceptions, policies, and institutional practices.

Building on this synthesis, the study treats the sociocultural context not as a passive backdrop, but as a source of direct predictive influence. Specific factors derived from SLT (e.g. sociocultural influence) are therefore examined as co-predictors alongside the individual appraisals from the extended TAM (usefulness, usability, and ethical concerns). By integrating these cognitive, ethical, and sociocultural variables into a unified model, this research posits that personal judgments and collective social forces are parallel influences that together provide a more holistic and ecologically valid account of technology acceptance.

This dual-lens theoretical background supports the study's objectives to (1) explore students' academic usage of AI, (2) understand their attitudes towards AI for learning, (3) examine teachers' concerns, challenges, and practices, and (4) generate evidence-based recommendations for integrating AI into instructional and assessment practices in high schools.

## Research questions

### For students

- RQ1. What AI tools are high school students using, and for what academic tasks?
- RQ2. How do students' perceive the usefulness and impact of AI on their learning?
- RQ3. What ethical concerns and risks do students associate with AI use in academic work?

### For teachers

- RQ4. How do high school teachers perceive and experience students' use of AI-powered applications?
- RQ5. What strategies and policies do high school teachers require to integrate AI?

## Methodology

This study employed a mixed-method sequential explanatory design (Creswell & Creswell, 2017), combining quantitative and qualitative approaches to provide a comprehensive understanding of high school students, teachers' perception of AI-powered tools. In the first phase, survey data were collected from students to identify patterns of use, attitudes, and ethical concerns. The second phase involved semi-structured interviews with students and teachers to elaborate and contextualize the quantitative findings. This design enabled deeper insights into the meanings and challenges of AI adoption in high school contexts. This two-stage design facilitated explanations and provided a deeper understanding of the quantitative findings (Creswell & Creswell, 2017; Ivankova et al., 2006).

## Participants for the quantitative study

The quantitative sample consisted of 545 high school students (259 male and 286 female) from grades 9 through 12 in Kashmir, India. A random sampling strategy was used to select the schools, while students within those schools were selected using simple random sampling. The mean age of the participants was 15.98 years ( $SD = 1.22$ , Range = 13–19). Both public ( $n = 118$ , 21.7%) and private schools ( $n = 427$ , 78%) were represented. The detailed overview of the demographic characteristics of the participants, including internet usage, frequency of AI tools use, and AI acceptance in schools are presented in Table 1.

**Table 1.** Shows the descriptive statistics of the samples.

Variable	<i>n</i>	%
Sex		
Male	259	47.5
Female	286	52.5
Grade		
9th grade	117	21.5
10th grade	198	36.3
11th grade	139	25.5
12th grade	91	16.7
School Type		
Public	118	21.7
Private	427	78.3
Daily Average Internet Use		
Less than 1 h	85	15.8
1–3 h	222	40.7
4–6 h	170	31.2
More than 6 h	68	12.5
AI tools usage frequency		
Never	0	0.0
Rarely	52	9.5
Sometimes	238	43.7
Often	176	32.7
Always	79	14.5
AI acceptance in schools (students' answer)		
Yes	12	2.2
No	111	20.4
There is no school policy about it.	422	77.4
Students' perception of teachers' ability to detect AI use (I think teachers can't tell if students used AI).		
Strongly Disagree	40	7.3
Disagree	151	27.7
Neutral	115	21.1
Agree	200	36.7
Strongly Agree	39	7.2

### Participants for the qualitative study

In the qualitative phase, the sample comprised 24 high school students (12 male and 12 female) and 24 teachers (14 male and 10 female). Students were purposively selected to ensure representation across grades and gender. Teachers were included to explore institutional concerns, strategies, and readiness for AI integration.

### Instrument for quantitative study

The survey was developed based on the Technology Acceptance Model (Davis, 1989) and Sociocultural Learning Theory (Vygotsky, 1978) to understand student attitudes towards AI better. The questionnaire comprised 20 items, in addition to demographic questions (e.g. age, gender, grade level, and prior exposure to AI technologies). The survey assessed five constructs using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The survey assessed five latent constructs such as Perceived Usefulness (PU) (Four items), Perceived Ease of Use (PEOU) (Four items), Attitude Toward Using AI (ATUAI) (Four items), Sociocultural and Self-Perceived Learning (SC&SPL) (Five items), and Ethical Concerns (EC) (Three items).

To ensure the validity and reliability of the instrument, a pilot study was conducted with a sample of 50 high school students. A pilot test with 50 students confirmed internal consistency: PU ( $\alpha = 0.71$ ), PEOU ( $\alpha = 0.72$ ), ATUAI ( $\alpha = 0.74$ ), SC&SPL ( $\alpha = 0.81$ ), and EC ( $\alpha = 0.78$ ). All final reliability coefficients exceeded the commonly recommended minimum threshold of 0.70 (Thorndike et al., 1991), confirming the internal consistency of the scales.

### Interview protocol

Semi-structured interview guides were developed separately for students and teachers. Student questions explored experiences with AI-powered applications, self-directed learning, and ethical concerns. Teachers questions addressed perceptions of student AI use, assessment challenges, institutional readiness, and

strategies for responsible integration. Protocols were validated through expert review and informed by preliminary survey results.

## Procedure

### *Data collection*

Ethical approval for the study was obtained from the Ethics Committee of Ibn Haldun University (Approval no: E-71395021-050.04-63718), adhering to all guidelines for research involving human participants. Written informed consent was secured from school administration and participants' parents after providing detailed information about the study's purpose, procedures, and confidentiality measures. Student surveys were administered in schools in paper-and-pencil format and took approximately 15–20 min to complete. For the qualitative phase, student focus groups (45–50 min) and teachers interviews (25–30 min) were conducted in school settings, with audio recordings made after obtaining consent.

### *Data analysis*

Quantitative data were analysed using SPSS version 26 software. Descriptive statistics were used to examine student demographics, patterns of AI tool usage, and the purposes for which students used them. To test the relationships between the theoretical constructs, inferential analyses were conducted. Specifically, Pearson correlations were calculated to assess the associations among all five key variables: PU, PEOU, SC&SPL, EC, and ATUAI. Following this, a multiple linear regression was performed to determine the extent to which the predictor variables (PU, PEOU, SC&SPL, and EC) predicted the outcome variable, ATUAI.

The qualitative data were divided into students' and teachers' data. Braun and Clarke's (2022) reflexive thematic analysis methods were employed to analyze the transcripts, supported by NVivo (version 12; QSR International). Two researchers independently coded a common subset ( $\approx 20\%$ ) to establish a shared codebook, then one researcher completed coding with regular peer debriefs. The analytical process involved two stages. First, initial themes were developed and refined for internal coherence and external distinction. Second, to systematically investigate the interplay between the theoretical frameworks, a co-occurrence analysis was performed using NVivo. This analysis identified key intersections between TAM-related constructs and SLT-related categories. Themes were refined for internal coherence and external distinction and are linked back to TAM and SLT constructs.

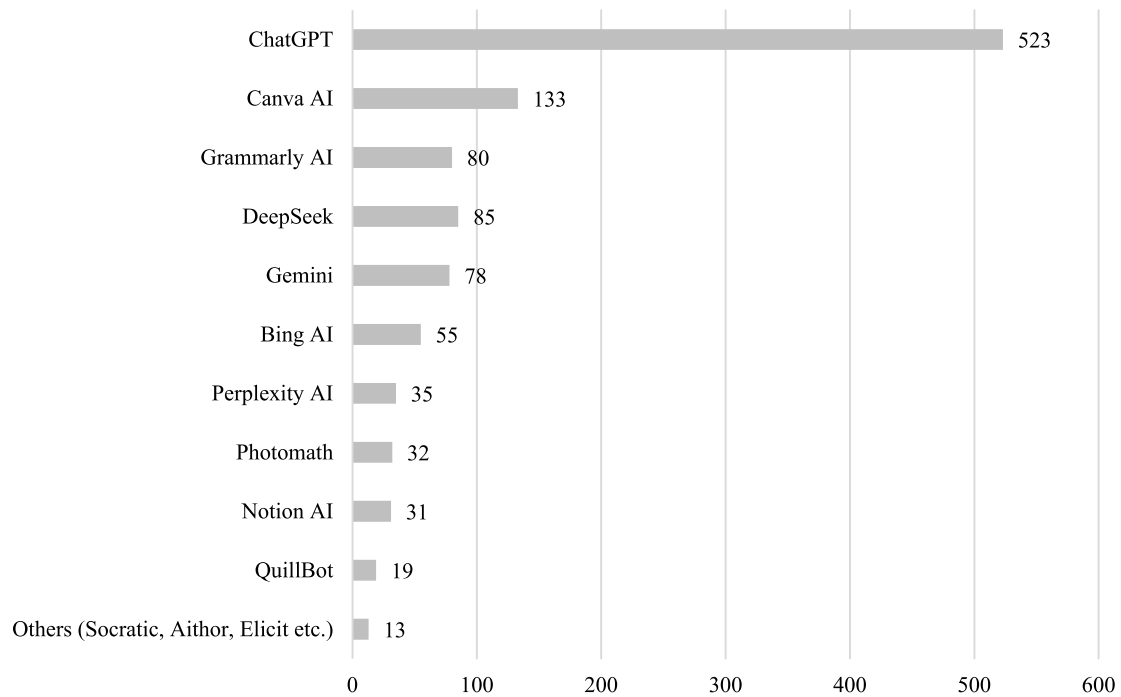
## Results

### *Quantitative findings*

This section reports the quantitative findings of the study, including descriptive statistics on students' AI tool usage and purposes, as well as inferential analyses examining the predictive roles of perceived usefulness, perceived ease of use, ethical concerns, and sociocultural and self-perceived learning on students' attitudes toward AI use.

### *AI tools used by students*

To address the first research objective, the study examined which AI tools students have most frequently used in the past three months. The results showed that AI use is widespread among students. As shown in [Figure 1](#), ChatGPT was by far the most frequently used tool, reported by 523 students (96%). It was followed by Canva AI ( $n = 133$ , 24.4%), Grammarly AI ( $n = 80$ , 14.7%), DeepSeek ( $n = 85$ , 15.6%), and Gemini ( $n = 78$ , 14.3%). Other tools with moderate usage included Bing AI ( $n = 55$ , 10.1%), Perplexity AI ( $n = 35$ , 6.4%), Photomath ( $n = 32$ , 5.9%), Notion AI ( $n = 31$ , 5.7%), and QuillBot ( $n = 19$ , 3.5%). Less frequently used tools, including Socratic, Aithor, and Elicit, were grouped under the "Other Tools" category ( $n = 13$ , 2.4%). Notably, AI-powered chatbots such as ChatGPT, DeepSeek, and Gemini emerged as the most frequently used tools, suggesting a strong student preference for conversational platforms that support interactive and text-based academic assistance. Canva AI may be commonly used due to its functionality in producing visually engaging content for school

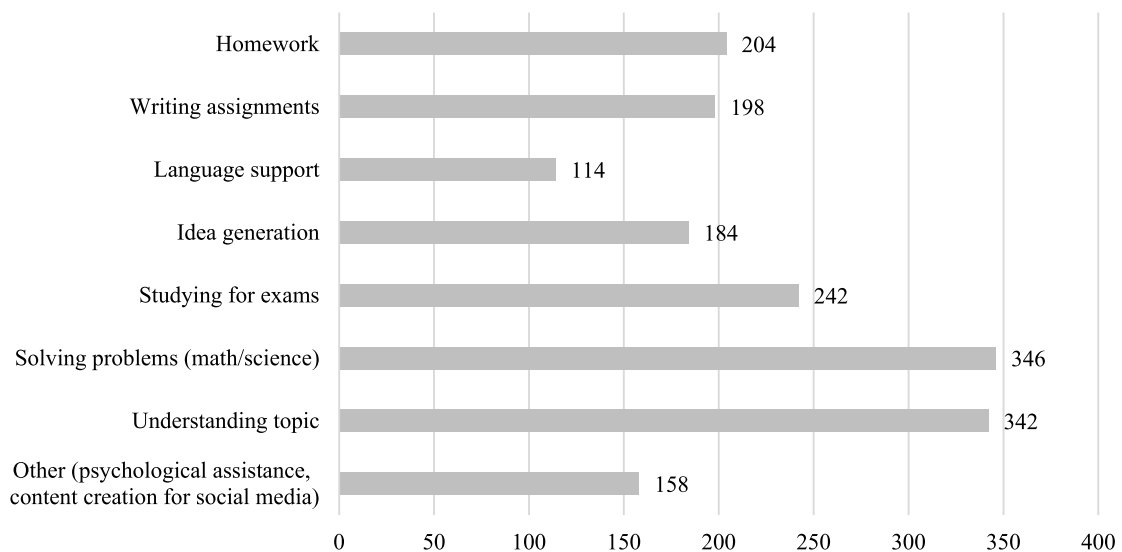


**Figure 1.** Number of students ( $N = 545$ ) reporting use of different AI tools in the last three months.

presentations and creative assignments. Similarly, Grammarly AI likely gained popularity for its utility in improving writing quality, which is essential for academic tasks and homework preparation.

### **Purpose of AI use**

To examine students' usage purposes, as outlined in the second research objective, participants were asked to indicate the academic tasks for which they use AI tools. As shown in [Figure 2](#), the most frequently reported purposes were solving problems in subjects such as mathematics or science ( $n = 346$ , 63.5%) and understanding academic topics ( $n = 342$ , 62.8%). Other common uses included studying for exams ( $n = 242$ , 44.4%), completing homework ( $n = 204$ , 37.4%), writing assignments ( $n = 198$ , 36.3%), and generating



**Figure 2.** Number of students ( $N = 545$ ) reporting their purposes for using AI tools in the past three months.

**Table 2.** Showing Pearson Correlations among key study variables.

<i>N</i> = 545	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5
1. PU	15.16	2.51	4–20	1				
2. PEOU	15.11	2.33	4–20	.43***	1			
3. ATUAI	15.24	2.77	4–20	.49***	.42***	1		
4. SC&SPL	18.23	3.53	5–25	.56***	.39***	.60***	1	
5. EC	7.75	2.68	3–15	-.31***	-.22***	-.33***	-.44***	1

$P < .001$ .

Note: PU = Perceived Usefulness; PEOU = Perceived Ease of Use; ATUAI = Attitude Toward Using AI; SC&SPL = Sociocultural and Self-Perceived Learning; EC = Ethical Concerns.

ideas ( $n = 184$ , 33.8%). Language support, such as translation or grammar assistance, was reported by 114 students (20.9%). An additional 158 students (29%) selected the “Other” option, which included diverse responses such as psychological support and social media content creation. These findings suggest that students mainly use AI tools for problem-solving and comprehension tasks, with some also exploring more personalized and creative uses beyond academic work.

### Correlation and predictors of attitudes

Pearson correlation coefficients were calculated to examine the relationships among the key study variables. As shown in Table 2 all variables were significantly correlated ( $p < .001$ ), with all associations being positive except for ethical concerns. Attitude toward using AI (ATUAI) was significantly and positively correlated with perceived usefulness (PU,  $r = .49$ ,  $p < .001$ ), perceived ease of use (PEOU,  $r = .42$ ,  $p < .001$ ), and sociocultural and self-perceived learning (SC&SPL,  $r = .60$ ,  $p < .001$ ). The negative correlation between Ethical Concerns (EC) and ATUAI was statistically significant ( $p < .001$ ), suggesting that the variable have a reverse relationship, meaning that if EC is getting higher then ATUAI is getting lesser or if ATUAI is getting higher then EC is getting lesser.

A multiple linear regression was conducted to identify the extent to which PU, PEOU, SC&SPL, and EC predict students’ attitudes toward using AI tools. To check for multicollinearity, the Variance Inflation Factor (VIF) was calculated for each predictor. All values fell well below the common threshold of 10 (VIFs ranged from 1.25 to 1.70), indicating that multicollinearity was not a concern (Hair et al., 2010). The overall regression model was statistically significant,  $F(4, 540) = 33.95$ ,  $p < .001$ , and accounted for approximately 42% of the variance in ATUAI ( $R^2 = .434$ ,  $R^2_{adj} = .421$ ). As shown in Table 3, SC&SPL showed the strongest association with ATUAI ( $\beta = .32$ ,  $p < .001$ ), followed by PEOU ( $\beta = .24$ ,  $p < .001$ ) and PU ( $\beta = .16$ ,  $p < .001$ ). Ethical concerns were found to have a negative relationship with attitudes toward AI ( $\beta = -.09$ ). This indicates that ethical considerations, while present, had a limited statistical influence on students’ overall attitudes in the context of the stronger predictors like sociocultural learning and perceived usefulness.

**Table 3.** Showing Multiple Linear Regression Analysis examining factors associated with attitudes toward using AI tools.

Variables	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>p</i>	95% CI		Collinearity Statistics	
						Lower	Upper	Tolerance	VIF
(Constant)	4.71	.96		4.90	< .001	2.83	6.60		
PU	.16	.05	.14	3.42	< .001	.07	.24	.78	1.27
PEOU	.24	.04	.2	5.25	< .001	.14	.32	.86	1.56
SC&SPL	.32	.03	.41	9.28	< .001	.26	.39	.75	1.34
EC	−0.09	.04	−.08	−2.15	.03	−0.16	−0.01	.85	1.18
Gender (Female)	.06	.18	-	.31	.75	−0.31	.43	.95	1.04
Grade (10th)	−0.13	.25	-	.49	.61	−0.62	.37	.96	1.03
Grade (11th)	.23	.27	-	.85	.39	−0.30	.76	-	-
Grade (12th)	.26	.31	-	.85	.39	−0.34	.86	-	-
School Type (Private)	−0.58	.38	-	−1.53	.13	−1.32	−0.16	.90	1.10
Ave. Int. Use (1–3 h)	−0.28	.27	-	−1.02	.30	−0.82	.26	.96	1.03
Ave. Int. Use (4–6 h)	−0.09	.29	-	−0.31	.75	−0.68	.49	-	-
Ave. Int. Use (more than 6 h)	−0.36	.36	-	−0.98	.32	−1.06	.35	-	-

Note:  $R = .659$ ,  $R^2 = .434$ ,  $R^2_{adj} = .421$ ,  $F_{4,540} = 33.95$ ,  $p < .001$ .

From Table 3 it is evident that all of the control variables are insignificant.

## Qualitative findings

### Students perspectives

The thematic analysis of the students' interviews revealed three major themes: emotional and social support, ethical concerns and risks, and self-learning and autonomy. Each theme is explained in turn, with illustrative quotes to support the narrative as shown in Table 4.

A co-occurrence analysis was conducted to explore the overlap of codes from both of the theoretical frameworks (TAM and SLT) within students' responses. As presented in Table 4, several quotes were coded simultaneously for constructs from multiple frameworks, highlighting meaningful intersections in students' experiences. Overall, these co-occurrences suggest that students' attitudes, ethical considerations, and self-perceived learning experiences are interconnected rather than independent, providing nuanced insight into how TAM constructs operate within SLT contexts.

### Emotional and social support

Beyond academics, student participants often described AI-powered interactive chatbots such as ChatGPT as "true friend" and companions that provide motivation, psychological comfort, and a self-expression. One participant shared:

I use ChatGPT like a friend, especially when I have no one else to talk to or share my feelings with. (Student 7)

Another participant explained:

ChatGPT feels like a trustworthy friend, and stressed its role in providing motivation and non-judgmental support, particularly during periods of loneliness. (Student 11)

It shows students perceive AI not only as a learning aid but also as a non-judgmental support, extending its role into emotional well-being. This highlights the sociocultural dimensions of AI use (SC&SPL), where technology mediates not only knowledge but also affective experiences of belonging and support. It also challenges the Technology Acceptance Model (TAM) by showing that attitudes towards AI are influenced as much by emotional and relational value as by perceived usefulness or ease of use.

### Ethical concerns and risks

Student participants voiced their ethical concerns and risks despite the benefits and frequent use of AI-powered applications. The problems and fears loom around the fear of over-reliance, diminished cognitive efforts, academic integrity.

One participant raised the concern and said:

I am using AI for various academic tasks and feel I am not using my cognitive capabilities. And even I feel too lazy to cross-check this information to see whether they are right or wrong. (Student 9)

Others associated AI with dishonesty:

Sometimes feelings of guilt; I feel using ChatGPT for my assignments feels like cheating. (Student 14)

**Table 4.** shows major research question, themes, codes, frequency and constructs (Students).

RQ	Theme	Definitions	Example Quotes	Constructs
RQ2	<b>Emotional and Social Support</b>	AI chatbots are seen as companions, offering motivation, non-judgmental conversation, and psychological comfort.	"I use ChatGPT like a friend, especially when I have no one else to talk to." (Student 7)	SC&SPL, ATUAI
RQ3	<b>Ethical Concerns and Risks</b>	Students expressed ambivalence about plagiarism, laziness, and reduced critical thinking from overreliance on AI.	"I feel I am not using my cognitive capabilities ... I even feel too lazy to cross-check information." (Student 9)	EC, SC&SPL
RQ2	<b>Self-Learning and Autonomy</b>	Many taught themselves AI use informally, using it for decision-making, organization, and self-regulated learning.	"I taught myself how to use AI; no one else showed me how." (Student 2)	PEOU, SC&SPL

Note: PU = Perceived Usefulness; PEOU = Perceived Ease of Use; ATUAI = Attitude Toward Using AI; SC&SPL = Sociocultural and Self-Perceived Learning; EC = Ethical Concerns; RQ = Research Question.

However, some students offered more permissive views, suggesting that responsible use is not problematic. As one explained:

AI is safe and ethical. There is nothing wrong with using it if used correctly, and when asked what you mean by properly, the Student responded: If we use it and learn from it rather than just copying and pasting it. (Student 17)

These mixed reflections highlighted students' ambivalence, revealing a tension between apprehensions about misuse and recognition of AI's value when applied with caution and responsibility. These tensions reflect the constructs of ethical concerns (EC) in TAM framework and underscore the sociocultural challenge of developing shared norms and literacy around responsible AI use in schools.

### ***Self-Learning and autonomy***

Lastly, students emphasized that their engagement with AI was largely self-taught, reflecting informal and peer-driven learning rather than formal school instruction. As one participant explained:

I taught myself how to use AI; no one else showed me how. (Student 2)

Others participant highlighted their efforts to critically evaluate AI's effectiveness, as reflected in the statement:

I occasionally use AI to assess how accurate and efficient it is. (Student 8)

In addition, students described using AI for decision-making and life improvement strategies. One participant noted:

AI assists me in making decisions and organizing my life. (Student 13)

While another reflected:

I discuss ways to improve my life with AI. (Student 21)

These accounts show that many students perceive AI as an external tool and a catalyst for self-regulated learning, personal growth, and autonomous problem-solving. This underscores AI's perceived ease of use (PEOU) and aligns with sociocultural learning theory, as adoption is mediated through informal online communities and individual exploration. In the absence of structured AI curricula, teenagers are independently shaping their own literacies, raising questions about equity, guidance, and responsible practice.

### ***Teachers perspectives***

The thematic analysis of the teachers interviews revealed four major themes: conditional optimism, concerns about deep learning and assessment authenticity, institutional preparedness, balancing traditional pedagogies with ethical AI integration as shown in [Table 5](#).

A co-occurrence analysis was conducted to examine the overlap of codes from both of the theoretical frameworks (TAM and SLT) within teacher participants' responses. As shown in [Table 5](#), several quotes were simultaneously coded for multiple constructs, highlighting intersections in teachers' experiences and perceptions of AI in educational contexts. Overall, these co-occurrences indicate that teachers' perceptions of AI's usefulness, ethical concerns, ease of use, and sociocultural engagement are interconnected, providing a nuanced understanding of how TAM constructs operate within educational contexts.

### ***Conditional optimism***

A prominent theme expressed by teachers was conditional optimism, in which participants consistently stressing the potential benefits of AI, but only when applied responsibly. Teachers highlighted AI's potential to enhance teaching and learning, support student growth, and align education with technological advancements.

**Table 5.** showing major themes, codes, and frequency (Teachers).

RQ	Theme	Definitions	Frequency (n)	Constructs
RQ4	Conditional Optimism	Teachers acknowledge AI's potential to enhance teaching and learning but stress cautious and responsible use.	"The use of AI in our schools is good ... but we must learn and teach students to use it responsibly." (Teacher 2)	PU, ATUAI
RQ4	Concerns about Deep Learning and Assessment Authenticity	Educators worry that AI overreliance reduces critical thinking, undermines intellectual growth, and complicates fair assessment of student work.	"Students often complete assignments with AI but cannot explain them." (Teacher 7) "Assignments no longer show genuine effort; teachers struggle to differentiate original from AI-assisted work." (Teacher 10)	EC, SC&SPL
RQ4- RQ5	Institutional Preparedness	Highlights absence of clear guidelines, national policies, and training. Calls for structured AI literacy programs for teachers, students, and parents.	"Without strict rules, students will misuse AI freely. We need national-level guidelines." (Teacher 1) "Teachers themselves need proper training ... students also need structured AI literacy programs." (Teacher 1)	PEOU, SC&SPL
RQ5	Balancing Traditional Pedagogies with Ethical AI Integration	Advocates blending AI with traditional teaching while embedding ethical literacy, ensuring AI supports rather than replaces human learning.	"It is time to redesign pedagogy and balance traditional and modern technologies. AI must be supportive, not a shortcut." (Teacher 1)	SC&SPL, EC

Note: PU = Perceived Usefulness; PEOU = Perceived Ease of Use; ATUAI = Attitude Toward Using AI; SC&SPL = Sociocultural and Self-Perceived Learning; EC = Ethical Concerns; RQ = Research Question.

As one Teacher emphasized:

The use of AI in our schools is good, and I firmly support it because I believe we need to adopt it to keep pace with technological advancement and a changing world. But we must learn and teach students to use it responsibly. (Teacher 5)

Similarly, a teacher remarked:

We must understand AI's potential benefits and harms in teaching and learning and integrate it into our schools accordingly; otherwise, our students will suffer. (Teacher 9)

Another Teacher highlighted the dual nature of AI integration:

Using AI in the teaching and learning process can be excellent and a game-changer, but we must be cautious in using it properly and effectively. (Teacher 2)

These perspectives illustrate that teachers acknowledge AI's potential usefulness. However, they also situate their optimism with a framework of caution and responsibility. These perspectives demonstrate a balance of enthusiasm for AI's usefulness (PU) with caution about misuse, reflecting both the Technology Acceptance Model (TAM) and a sociocultural emphasis on institutional safeguards.

### **Concerns about deep learning and assessment authenticity**

Teachers expressed strong concern that overreliance on AI was eroding students' critical thinking and authentic engagement. They described students becoming passive recipients of AI outputs, unable to explain their own work. One teacher remarked, "*Students often complete assignments with AI assistance but cannot explain the content when questioned, suggesting superficial engagement and overreliance.*" (Teacher 7). Another teacher added, "*Students show blank expressions when cross-questioned ... those expressions clearly show overdependence on AI with no development of cognitive capabilities.*" (Teacher 12). Another Teacher shared similar worries: "*With the rampant use of AI, students are not growing intellectually; they are using AI to complete tasks instead of developing their cognitive capabilities.*" (Teacher 8).

A related challenge involved assessment authenticity and fairness. Teachers reported difficulty distinguishing between student-generated and AI-generated work. One teacher explained, "*It's common to see homework that is unusually perfect or far beyond a student's known capability. As a class teacher, I can tell when students submit work that is clearly AI-assisted.*" (Teacher 3). In larger classrooms, a teacher highlighted that grading became even more difficult: "*In many of our classes, enrolment is very high, and it's hard for teachers to remember every student, so properly assessing and grading students' work is a big challenge.*" (Teacher 4). These accounts highlight ethical concerns (EC) and sociocultural risks, reinforcing

that while AI may increase efficiency, it also threatens the fairness and validity of traditional assessment systems.

### ***Institutional preparedness: policy and capacity building***

Teachers consistently emphasized a policy vacuum and a lack of institutional preparedness for AI adoption. Teachers noted that students often used AI without understanding plagiarism or ethical boundaries, treating it like any other application. A Teacher cautioned, *“High school students are teenagers ... they do not fully understand the ethical implications of using AI. Without strict written rules and policies, students will misuse AI freely. We need national-level guidelines on AI usage in schools.”* (Teacher 1, 10).

Alongside policy, professional development and AI literacy were repeatedly identified as urgent needs. Many teachers admitted they lacked sufficient knowledge to guide students. One senior teacher stated, *“Teachers themselves need proper training ... students also need structured AI literacy programs.”* (Teacher 1). Teachers highlighted the importance of system-wide interventions: *“AI must be integrated into the curriculum and taught like any other subject. We need capacity building for teachers, students, and parents alike.”* (Teacher 7). These accounts emphasize that AI integration requires not only technology but also structured training, clear policies, and collective awareness-building. Within TAM, improving AI literacy enhances perceived ease of use (PEOU) and perceived usefulness (PU), while sociocultural theory underscores the institutional role in shaping responsible adoption.

### ***Balancing pedagogy with ethical AI integration***

Finally, teachers stressed the importance of balancing AI integration with traditional pedagogies and ethical literacy. Teachers warned that while AI is inevitable, it must not replace core values, critical thinking, or teacher-student relationships. One teacher explained, *“It is time to redesign and upgrade pedagogy and try to balance traditional and modern technologies. We must ensure AI becomes a supportive tool, not a shortcut that compromises learning.”* (Teacher 17). Another emphasized ethical responsibility: *“We cannot stop students from using AI randomly, so we must instil core values and ethical understandings to use AI properly.”* (Teacher 21).

These accounts show that while teachers accept AI as part of future classrooms, they see its role as complementary rather than substitutive. From a sociocultural perspective, AI must be embedded within cultural practices and ethical norms. From a TAM perspective, perceived usefulness (PU) of AI is contingent on ethical safeguards and pedagogical redesign.

## **Discussion**

This study examined how high school students perceive and use AI-powered tools, drawing on the Technology Acceptance Model (TAM) and Sociocultural Learning Theory (SLT). The findings highlight both convergences and divergences in perspectives and suggest that AI adoption in secondary education is shaped not only by perceived usefulness and ease of use but also by sociocultural, ethical, and affective dimensions.

### ***Quantitative insights: extending TAM with sociocultural factors***

Consistent with recent studies, our findings confirm that AI is deeply embedded in students' academic routines, with a clear preference for conversational platforms like ChatGPT for tasks such as conceptual clarification and assignment help (Zhu et al., 2024). However, this study provides a more nuanced picture by revealing that students also leverage these tools for creative and psychological support, extending the primarily academic focus of earlier studies (e.g. Levine et al., 2025; Turós et al., 2025). The importance of local context becomes evident when comparing these patterns internationally. The exceptionally high reliance on ChatGPT (96%) in our Kashmir sample, for instance, contrasts sharply with the greater tool diversity in Cambodia (Sok et al., 2025) and the gender-moderated use in Hungary (Turós et al., 2025). In contrast, students in the present Kashmir sample reported an exceptionally high reliance on ChatGPT (96%), suggesting that

accessibility and language compatibility drive adoption more than curricular design. These differences likely reflect contextual factors such as infrastructure, availability of localized applications, and varying levels of institutional regulation. Such comparisons highlight the importance of cultural and policy environments in shaping patterns of AI adoption across regions.

Regression analysis showed that perceived usefulness (PU), ease of use (PEOU), and especially sociocultural and self-perceived learning (SC&SPL) predicted positive attitudes. SC&SPL emerged as the strongest predictor, suggesting that students value AI most when it facilitates engagement, collaboration, and autonomy. This resonates with Falebita et al. (2025) who found that self-efficacy and social support were key to adoption in higher education, but it also extends their work by demonstrating the salience of sociocultural factors in adolescent learning contexts.

Ethical concerns were found to negatively correlate with high school students' attitudes toward the use of AI, indicating that ethical considerations significantly shape their perceptions. When students view AI use as ethically problematic, they often report feelings of guilt or a sense of "cheating" after relying on AI-powered applications. This suggests that ethical concerns strongly influence students' overall attitudes toward AI. Similar results were reported in higher education, where Qu and Wang (2025) and Chan (2024) found that AI guilt significantly reduced students' willingness to use ChatGPT for certain academic tasks.

In the context of high school students, although many recognize the ethical issues associated with using AI in academic tasks, the learning environment reduces their perceived risks. In several Indian schools, for example, assignments are still handwritten and submitted in traditional formats, limiting the use of plagiarism detection or AI-detection tools. As a result, students may feel less likely to face penalties for unethical use. This reduced perception of risk weakens the influence of ethical concerns on their overall attitudes toward AI, leading them to rely more heavily on such applications.

### ***Qualitative insights: affective and institutional dimensions***

The interviews deepened these patterns, revealing three central student themes. First, AI was described as a social and emotional companion, with students frequently referring to ChatGPT as a "friend." This finding is consistent with Giray (2025) and Nazir (2025) who observed similar identity and relational uses of AI among adolescents, but it also raises concerns. As highlighted by Wang et al. (2025) reliance on AI for emotional support can be problematic given that chatbots are not validated for therapeutic purposes. Recent incidents involving harmful chatbot interactions reinforce the risks of unconditional trust in AI for emotional issues (Booth, 2025).

Second, students expressed ethical ambivalence. Some reported guilt about using AI for assignments, echoing Pitts et al. (2025) while others argued that learning from AI was acceptable if done responsibly. This mirrors broader findings that adolescents negotiate ethical boundaries situationally in the absence of clear institutional guidance (Durall Gazulla et al., 2025; Fu & Weng, 2024; Gouseti et al., 2025).

Third, students described themselves as largely self-taught users, learning through peers or experimentation. Many students characterized their learning as self-taught, relying on experimentation and peer support to develop proficiency with AI tools in resource-constrained settings (Mkhasibe & Ajani, 2024; Yue Yim, 2024). In secondary education, however, the lack of formal curricula raises equity concerns, as students with stronger digital literacy may benefit disproportionately.

Teachers provided a complementary but more systemic perspective. Their conditional optimism reflected recognition of AI's potential to enhance instruction, consistent with Holmes and Tuomi (2022), but was tempered by concerns about unintended consequences. In particular, teachers stressed erosion of critical thinking and assessment authenticity, echoing warnings by Shah and Asad (2024) and Zhai et al. (2024) that uncritical reliance fosters shallow learning. Calls for more process-oriented assessment, such as iterative drafts and oral explanations, align with Archer et al. (2025), who argue that authenticity in evaluation must be redefined in the AI era.

Institutional preparedness was another recurring theme. The absence of policies and training mirrors concerns raised by Miao and Holmes (2021) and Muringa (2025) who warned that lack of systemic guidance amplifies ethical ambiguity. Teachers in this study not only called for professional development but also emphasized the need to involve parents, reflecting recognition that adolescent learning is embedded within broader ecological systems.

### ***Synthesizing student and teacher perspectives***

Taken together, the findings reveal both convergence and divergence in how AI is framed in high school contexts. Students emphasized individual dilemmas plagiarism, over-reliance, or emotional dependence while valuing AI's role in autonomy and motivation. Teachers, by contrast, highlighted institutional challenges of assessment integrity, critical thinking, and policy readiness. This dual perspective underscores that sustainable AI adoption requires attention to both micro-level student experiences and macro-level systemic reforms.

Theoretically, the findings extend TAM by demonstrating that technology acceptance in education is shaped not only by usefulness and ease of use but also by affective drivers (e.g. companionship, emotional reliance) and institutional scaffolding (e.g. policies, pedagogy, training). From a sociocultural perspective, AI emerges as a mediating tool on multiple levels: for students, it scaffolds learning, self-expression, and belonging; for educators, it disrupts established norms and demands new forms of pedagogy and governance.

### ***Dual strategy for sustainable AI adoption***

The overall picture suggests a precarious balance. On one hand, AI can catalyze personalized, autonomous, and engaging learning experiences; on the other, unregulated use risks undermining fairness, academic integrity, and ethical norms. Addressing these tensions requires a dual strategy: embedding AI literacy and ethical awareness into student learning while simultaneously equipping teachers and institutions with policies, training, and frameworks for responsible integration. By bridging TAM with sociocultural theory, this study contributes to a more holistic model of AI adoption in secondary education one that recognizes cognitive, affective, and institutional dimensions as equally central.

### **Conclusion**

This study offers one of the first comprehensive explorations of how high school students and teachers perceive and engage with AI-powered tools in education. By combining the Technology Acceptance Model (TAM) with a sociocultural lens, the findings demonstrate that AI adoption is shaped not only by perceived usefulness and ease of use but also by affective, ethical, and institutional factors.

For students, AI emerged as both a cognitive and emotional mediator. Many relied on tools such as ChatGPT for problem-solving, exam preparation, and writing support, while others described it as a “friend” offering comfort, motivation, and self-expression. These perspectives extend TAM by underscoring affective drivers of acceptance and resonate with Vygotsky's sociocultural theory, which highlights the emotional and social contexts of learning. At the same time, this emotional reliance raises ethical concerns, given that conversational agents are not designed or validated for mental health support.

Students also expressed ambivalence about risks such as plagiarism, over-reliance, and reduced cognitive effort, as well as tensions between functional benefits and academic integrity that remain unresolved. Teachers echoed these concerns but framed them at the systemic level, focusing on the erosion of critical thinking, authenticity of assessment, and the absence of clear policy frameworks. Their stance reflected conditional optimism: welcoming AI's pedagogical potential while stressing the need for safeguards, professional development, and institutional guidance.

Together, these perspectives reveal both overlap and divergence. Students and teachers share optimism about AI's educational promise, yet adolescents navigate ethical dilemmas individually, whereas teachers emphasize systemic readiness and reform. The findings point to a precarious balance: AI can enrich personalized and engaging learning experiences, but unregulated adoption risks undermining critical thinking, fairness, and ethical norms.

To advance responsibly, schools must pursue a dual strategy: embedding AI literacy and ethical awareness into student learning while equipping teachers with training, policy frameworks, and capacity-building resources. Such measures can ensure that AI functions as a supportive cultural tool enhancing both academic outcomes and socio-emotional development rather than a shortcut that compromises learning.

Future research should adopt longitudinal and cross-cultural designs to track these dynamics over time and to build robust, equitable models for sustainable AI integration in secondary education.

## Recommendations

The findings of this study highlight several avenues for strengthening the responsible integration of AI in secondary education. High school curricula should embed structured modules on AI literacy that emphasize not only technical proficiency but also critical evaluation, authorship, plagiarism, bias, and the limitations of AI systems. Alongside curricular efforts, students need guided opportunities to reflect on scenarios involving academic integrity, over-reliance, and misinformation, thereby cultivating a culture of responsible and ethical use.

Teachers play a central role in this process, and systematic professional development is essential to equip them with both the technical understanding of AI tools and the pedagogical strategies required to redesign assessment and classroom practices. Traditional approaches to evaluation must also evolve toward process-oriented formats such as iterative drafts, reflective journals, and oral explanations, which ensure authenticity and reduce the risk of unverified AI authorship while still valuing creativity and comprehension.

Beyond general calls for AI literacy and ethics training, implementation strategies could include (a) integrating AI literacy modules within existing “information and communication technology” curricula, (b) establishing teacher certification programs focused on AI pedagogy and assessment integrity, and (c) forming school-level AI ethics committees that periodically review emerging tools and classroom uses. Such targeted, multi-level initiatives can help operationalize the study’s recommendations and translate them into actionable educational practices.

At the institutional level, schools and educational authorities should develop clear and transparent guidelines that specify permissible and impermissible uses of AI. These policies should be co-constructed with teachers, students, and parents to ensure that they are not only enforceable but also equitable and contextually appropriate.

Finally, the socio-emotional dimensions of AI use require attention. Students are increasingly turning to AI systems for companionship and psychological comfort, underscoring the need to expand human-centered counseling and peer-support structures so that AI serves as a complement rather than a replacement for interpersonal relationships. Future research should build on these findings through longitudinal and cross-cultural designs, offering insights into how attitudes and practices evolve over time and which models of integration are most effective across diverse educational contexts.

## Limitations

This study’s findings should be interpreted in light of several limitations. First, the sample is geographically confined to the Kashmir region of India, which restricts the generalizability of results to other cultural or educational contexts. Although the student sample size was substantial, the relatively smaller teacher sample may not fully capture the diversity of institutional perspectives. Second, the study’s cross-sectional design and reliance on self-reported data limit causal inference and may introduce social desirability or recall biases. Furthermore, the predominance of ChatGPT in the reported data could reflect tool-specific usage patterns rather than general attitudes toward AI-assisted learning. Future research should include more geographically diverse and institutionally varied samples, employ longitudinal or experimental designs, and examine a broader range of AI tools to enhance external validity and theoretical robustness. A limitation of this study is its use of multiple regression instead of Structural Equation Modeling (SEM). This analytical approach was deliberately chosen as the primary research objective was to identify the direct predictive strengths of individual cognitive and sociocultural factors on student attitudes, a task for which multiple regression is a robust and highly appropriate tool. While SEM would offer a more comprehensive test of the overall theoretical model’s fit, the direct results of regression were better aligned with the study’s explanatory goals. We therefore recommend that future research employ SEM to validate the structural components and latent measurement models more comprehensively. To partly address these limitations, the qualitative phase of this study provides additional perspectives, particularly from teachers, that enrich and contextualize the quantitative findings.

## Submission declaration and verification

We hereby declare that the submitted article is our original work and has not been published previously, nor is under consideration for publication elsewhere and that its submission has been approved by all co-authors. We further acknowledge that, if accepted for publication, this article will not be published elsewhere in the same form, in English or any other language, including electronically, without the written consent of the copyright holder. To ensure compliance with ethical publication standards, We accept that the article may be subjected to verification through Crossref Similarity Check and other originality or duplication detection software.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Ethics statement

The studies involving human participants were reviewed and approved by Ethics Committee of Ibn Haldun University (Approval no: E-71395021-050.04-63718). The participants parents and school administration provided their written informed consent to participate in this study.

## Author contributions

The study was conceptualized and primarily developed by TN and AÖ, who contributed substantially to the study design, literature review, and writing of the manuscript. TN conducted the literature review, performed the data analysis and provided insights into the interpretation of results. TN supported the study by providing guidance on appropriate instruments, assisting in data collection, and conducting thorough proofreading of the manuscript. AÖ performed the data analysis and provided insights into the interpretation of results. All authors reviewed and approved the final version of the manuscript for submission.

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## Declaration of generative AI in scientific writing

During the preparation of this work the authors used Grammarly AI in order to enhance fluency and maintain an academic tone. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## Data availability

The data that support the findings of this study are available on request from the corresponding author, TN.

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