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Reading Comprehension in AI-Supported Storytelling: Evidence from Fourth-Grade Students' Interactions with Generative Artificial Intelligence

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Abstract

This study investigates how fourth-grade primary school students' interactions with generative artificial intelligence tools—specifically ChatGPT and Microsoft Copilot—during story-creation tasks are reflected in their native-language reading skills. Using a qualitative design embedded within an action-research process, data were gathered through semi-structured interviews, in-class observations, field notes and students' written responses to two story-comprehension forms derived from AI-generated narratives. The data were analysed through thematic content analysis, supported by descriptive statistics. Guided by Rosenblatt's reader-response theory, Kintsch's construction–integration model, inference-based comprehension research and the Turkish fourth-grade language arts learning outcomes, the analysis produced five key themes: Text Comprehension, Inference-Making, Detail Awareness, Emotional Response and Connection, and Word Consciousness. Across the dataset, 132 codes were identified. Findings indicate that students demonstrate strength in fundamental text comprehension and event-focused interpretation but show limited development in abstract inference, vocabulary awareness and deeper affective engagement. AI-supported story production appears to scaffold comprehension processes by helping students recognise narrative structure, form empathetic connections with characters and draw on personal experiences while making meaning. Individual analyses of focal participants reveal a shift from surface-level recall to more reflective, value-oriented and empathy-driven reading behaviours. Overall, the results suggest that AI-supported storytelling holds promise as a pedagogical tool for enhancing native-language reading, provided it is accompanied by explicit instruction targeting inference-making, vocabulary development and critical engagement with AI-generated texts.

Keywords: Artificial Intelligence, Generative AI, Reading Comprehension, Primary Education, Turkish Language Arts

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Introduction

The rapid development of generative artificial intelligence (AI) has introduced new and still largely unexamined dynamics into language and literacy education. Tools such as ChatGPT and Microsoft Copilot can instantly generate coherent narrative texts from brief prompts, making it possible to design reading tasks that are seemingly authentic, engaging, and closely aligned with students' own narrative contributions. Despite this potential, the specific consequences of these tools for children's native-language literacy, especially in the primary school years when foundational reading skills and dispositions are formed, remain insufficiently understood. This lack of clarity becomes more critical when AI is integrated directly into core processes of reading and comprehension. When students not only read but also co-construct texts with AI systems, the nature of their interaction with written language changes: reading evolves from a one-way encounter with a pre-given text into a technology-mediated, iterative process. In such contexts, it is not yet known how AI-mediated narratives shape students' comprehension of stories, their inferential thinking, their attention to textual details, their emotional engagement with characters, or their sensitivity to words and language use.

Existing research on AI in education suggests that these technologies have the capacity to transform reading practices at a structural level. Ademola's (2024) comprehensive study shows that AI-supported learning environments fundamentally reorganise traditional reading strategies and the pedagogical assumptions that underpin them. According to this study, AI integration allows instructional processes to be personalised at a micro level: intelligent systems can monitor students' reading performance in real time, detect emerging difficulties in textual comprehension, and provide immediate, data-driven feedback. Such capabilities create new possibilities for targeted scaffolding and for preventing the consolidation of misunderstandings.

The integration of AI into reading processes offers powerful mechanisms for tailoring learning to individual differences. Adaptive learning systems can adjust content and task demands to students' cognitive profiles and learning preferences, thereby deepening the quality of interaction with texts. By analysing learners' comprehension levels dynamically and reorganising reading activities on the basis of these analyses, AI algorithms can increase the apparent effectiveness and precision of educational interventions. Yet, these opportunities are intertwined with substantial ethical, epistemological, and professional challenges. As Ademola emphasises, issues related to data privacy, unequal digital access, and algorithmic bias in AI systems' data collection and analysis processes pose serious risks. If left unaddressed, such risks may reinforce existing inequities and undermine trust in educational technologies. Moreover, the expanding role of AI redefines teachers' professional responsibilities: it is no longer sufficient for educators merely to operate AI tools; they must also develop the pedagogical and critical competencies required to integrate these tools in ways that genuinely enhance literacy learning rather than displace it. This, in turn, points to the need for teacher education programmes that include AI literacy and technology-enhanced pedagogical approaches.

Taken together, these considerations highlight a central tension: while AI technologies, and generative AI in particular, offer unprecedented opportunities to personalise and enrich reading experiences, their concrete impact on students' native-language reading comprehension—especially in authentic classroom contexts—remains an open empirical question. Addressing this question is crucial for ensuring that AI-supported reading innovations are pedagogically meaningful and ethically sustainable. Against this backdrop, the present study investigates how fourth-grade students' interactions with AI-based storytelling tools are reflected in their reading comprehension in Turkish. Within a structured classroom implementation, students provided narrative elements (character, setting, time and plot) to ChatGPT and Microsoft Copilot, obtained AI-generated stories based on these inputs, read the resulting texts, and then completed story-comprehension forms. The analysis focuses on how these AI-mediated experiences relate to students' abilities to understand narrative texts, make inferences, attend to details, develop emotional connections with characters, and demonstrate word consciousness. By examining these dimensions, the study aims to contribute empirical evidence to ongoing debates about the role of generative AI in reading education and to

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inform future pedagogical and policy decisions concerning AI-supported literacy practices. The study is guided by the following research question:

How are fourth-grade primary school students' native-language reading skills reflected in their responses to stories generated through interaction with AI tools such as ChatGPT and Microsoft Copilot?

Theoretical Framework

The analytical framework for this study is grounded in three complementary theoretical perspectives and the national curriculum, each illuminating a distinct dimension of students' reading processes in AI-mediated learning environments. Rosenblatt's (1938, 1978) reader-response theory provides the affective and experiential foundation, emphasising the transactional nature of reading and the ways in which meaning emerges through the dynamic interplay between the reader and the text. From this perspective, students' prior experiences, emotional states and personal associations are not peripheral but essential elements that shape their engagement with AI-generated narratives—texts that are simultaneously familiar and novel due to their algorithmic authorship.

Kintsch's (1998) construction–integration model contributes a cognitive lens, foregrounding the processes through which readers build propositional representations, integrate local and global textual cues and construct coherent situation models. This framework is particularly relevant for understanding how children process AI-generated stories, as such texts often display structurally consistent narrative patterns that may either support or challenge young readers' abilities to detect causal relations, track narrative progression and maintain global coherence.

Inference-based models of reading comprehension (e.g., Cain & Oakhill, 1999) inform the study's focus on higher-order meaning-making. These models highlight the centrality of bridging and elaborative inferences for moving beyond literal interpretations—an especially salient competency when interacting with AI-produced texts that may contain implicit cues, culturally nuanced expressions or atypical narrative decisions. This perspective guided the identification of students' attempts to interpret unstated meanings, derive value-based messages and engage critically with narrative content.

In addition to these theoretical foundations, the study is aligned with the Turkish Ministry of National Education (MEB, 2024) fourth-grade Turkish language arts outcomes, especially those pertaining to:

- identifying characters, events, setting, main idea and theme
- making predictions and inferences from text
- analysing emotional and value-laden messages
- recognising and using words with varied semantic relations

Together, these curricular and theoretical perspectives informed the development of the coding framework and ensured that the thematic categories reflected not only data-driven patterns but also established models of reading comprehension, cognitive processing and reader–text interaction within AI-supported literacy contexts.

Methodology

Research Design

The study employs a qualitative approach embedded in an action-research cycle. Conducted over a period of 45 days, the process was iterative: initial AI-supported story tasks were implemented,

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student responses were analysed, and subsequent tasks—including the second, more structured comprehension form—were refined to elicit deeper and more reflective reading behaviours.

Study Group and Context

The participants were fourth-grade students who took part in the action-research process conducted in a public primary school. All participating students engaged in AI-supported story-creation tasks throughout the implementation. A total of 30 students participated in the study, and six focal participants (Ezgi, Fatma, Bengü, Önder, Umut and Ahmet) were selected for in-depth qualitative analysis. All participant names are pseudonyms assigned to protect student identity. These six key participants were chosen through maximum variation sampling, taking into account differences in participation, expressive behaviours, socio-economic background, family structure and access to technology.

For the purposes of in-depth qualitative analysis, these focal students were examined closely because they represented a broad range of engagement styles, narrative preferences and developmental characteristics relevant to the aims of the study. The key participants attended a fourth-grade classroom in a public primary school located in a city of Marmara Region, Türkiye. All were approximately ten years old and came from diverse socio-economic backgrounds, family structures and levels of access to digital resources. This diversity enriched the AI-supported storytelling process and enabled a wide range of reading behaviours to emerge.

Fatma lives with her parents and two older sisters; her father works in animal husbandry and farming, while her mother occasionally supports these activities. The family has a laptop and internet connection at home, although Fatma does not have her own tablet or phone. Both parents are middle-school graduates. Fatma enjoys drawing, singing, dancing and caring for cats.

Bengü's mother is a homemaker and her father is a farmer. She has one older sister and one older brother. Although the household does not have a computer, they have internet access. She has a smartphone without an active SIM card. Her mother completed primary school and her father completed middle school. She enjoys drawing, singing and dancing, and her family keeps a cat, dog and several birds at home.

Ahmet's parents are farmers; his mother completed primary school and his father did not finish middle school. The household has internet access and a tablet but no computer or phone. Ahmet is an only child and enjoys singing, playing ball games and hide-and-seek. He reported an accident in his early childhood that he still remembers vividly, which appears to contribute to his strong attention to detail in narratives.

Ezgi's father works in the industrial sector and her mother is a homemaker. She has one older sister and one younger brother. The family has a computer and internet access at home, and Ezgi also owns a tablet. Her mother is a high-school graduate and her father is a university graduate. She enjoys dancing, playing volleyball and singing, and she keeps pigeons at home, showing a strong interest in animals.

Önder's father works in the industrial sector and his mother takes care of cattle. He has one older brother. Although the family does not have a computer, they have internet access, and Önder owns a tablet. He keeps pigeons in the garden and enjoys playing ball games and spending time outdoors.

Umut's father works in the industrial sector and his mother is a homemaker; both parents are middle-school graduates. He has one older sister and one younger brother. The family has a computer and internet connection; Umut has limited internet access on his smartphone but does not own a tablet. He enjoys drawing, and the family keeps a cat. Umut mentioned experiencing a boat accident in the past, which appears to have heightened his emotional sensitivity in narrative tasks.

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None of the students had prior experience with AI tools before the study. The intervention therefore constituted their first exposure to AI-supported storytelling, creating a naturalistic learning environment in which novice users engaged with generative AI in authentic classroom conditions.

Data Collection

To ensure methodological rigor and establish robust data triangulation, the study utilised multiple complementary data sources.

AI-supported story-creation tasks:

Students generated narratives using two generative AI tools. First, they interacted with ChatGPT (GPT-3.5), followed by Microsoft Copilot, by providing narrative elements such as character, setting, time and plot. These tasks created a naturalistic environment in which students engaged with AI-mediated storytelling for the first time, producing texts that served both as instructional materials and as data for subsequent comprehension analyses.

Story-comprehension forms (Form 1 and Form 2):

Form 1 was adapted from Esmer's (2019) validated narrative text comprehension test for primary students and was revised through expert consultation to align with the aims of the present study. It assessed foundational narrative components (characters, time, place, events and problem–solution structures). Form 2, developed specifically for this research, included more elaborative and cognitively demanding prompts targeting inference-making, emotional engagement and word consciousness. Its design was informed by the patterns emerging from Form 1 and by expert feedback, enabling the elicitation of deeper, more reflective reading behaviours.

Observations and field notes

The researcher conducted systematic classroom observations throughout both the AI-interaction and reading-comprehension sessions. Student behaviours, engagement levels, spontaneous verbal expressions and peer interactions were documented in detailed field notes to capture contextual and process-oriented dimensions of reading.

Semi-structured interviews:

Interviews were carried out to further explore students' interpretations of AI-generated stories, their perceptions of characters and events and their experiences using AI tools. These interviews enriched the data set by offering insight into students' cognitive, emotional and evaluative reasoning.

Data Analysis

All qualitative data sources—including students' story-comprehension forms, semi-structured interviews, field notes and supplementary documents—were analysed through a thematic content analysis procedure. The analytic process followed a two-stage design that integrated inductive and framework-based strategies, ensuring that emerging themes were simultaneously grounded in the empirical data and theoretically coherent with the study's conceptual foundations.

In the first stage, an inductive, data-driven coding process was undertaken. Meaningful units were identified directly from students' written and verbal responses, as well as their observable reading behaviours, without the imposition of predetermined categories. This stage enabled nuanced patterns to surface organically—for instance, how students interpreted narrative events, formed inferences, expressed emotional reactions or attended to specific textual cues. Rather than producing a simple descriptive inventory, this inductive phase constituted a rigorous bottom-up content analysis in which initial codes were derived from students' authentic expressions and behavioural indicators. This

approach ensured that subsequent analytical categories faithfully reflected the lived reading processes mediated by AI-generated narratives.

Second, the analysis proceeded with framework-based coding. The inductively generated codes were reorganised within an analytical structure derived from the theoretical framework and the MEB (2024) Turkish reading outcomes. This framework drew specifically on:

- Rosenblatt's (1978) reader-response theory (emotional engagement, aesthetic stance),
- Kintsch's (1998) construction–integration model (global and local text comprehension),
- Cain and Oakhill's study on inference-making processes,
- international research on word consciousness and metalinguistic awareness,
- MEB (2024) reading outcomes relating to comprehension, inference, attention to details and vocabulary development.

Through this two-stage analytic process, the resulting themes were not merely descriptive categories; rather, they reflected higher-level conceptual patterns that explained students' cognitive and affective reading processes. The themes emerged inductively from the data and were subsequently strengthened and clarified through alignment with theoretical models.

Identified Themes

1. *Text Comprehension*: Students' ability to construct both global and local meaning from narrative texts, consistent with Kintsch's macro- and microstructure processes and MEB comprehension outcomes.

2. *Inference-Making*: Students' use of bridging and elaborative inferences, aligned with the cognitive mechanisms described in Cain and Oakhill's inference research.

3. *Detail Awareness:* Sensitivity to descriptive elements, narrative cues and contextual details necessary for coherent story understanding.

4. *Emotional Response and Connection*: Affective engagement with characters and events, reflecting Rosenblatt's conceptualisation of aesthetic reader–text interaction.

5. *Word Consciousness*: Awareness of vocabulary, word meanings and language use, consistent with research on word consciousness and metalinguistic development.

Trustworthiness of the Analysis

To enhance trustworthiness, three independent experts reviewed the coding scheme and coded a selected subset of the data. Their feedback was used to refine theme definitions, check the alignment between inductive codes and the theoretical framework, and resolve any discrepancies. These procedures strengthened the credibility, dependability and confirmability of the analysis in line with qualitative research standards (Lincoln & Guba, 1985).

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Findings

Table 1. *Frequencies and Percentages of Codes by Theme and Sub-Category*

Themes and Subcategories	**F**	**Overall Percentage (%)**	**Percentage Within Theme (%)**
Text Comprehension	52	39.39	100.0
→ Character	18	13.64	34.62
→ Time	10	7.58	19.23
→ Setting	6	4.55	11.54
→ Event	12	9.09	23.08
→ Main Idea	6	4.55	11.54
Inference-Making	28	21.21	100.0
→ Value Identification	15	11.36	53.57
→ Extraction of Main Message	13	9.85	46.43
Detail Awareness	24	18.18	100.0
→ Noteworthy Scene	14	10.61	58.33
→ Sequence of Events	10	7.58	41.67
Emotional Response and Connection	20	15.15	100.0
→ Character Preference	11	8.33	55.0
→ Empathy / Identification	9	6.82	45.0
Word Consciousness	8	6.06	100.0
→ New Word / Expression	8	6.06	100.0

Note. *The frequencies presented in this table were determined through content analysis of data obtained from interview transcripts, observations, field notes and document analysis. The percentages were calculated based on both the overall frequency distribution and the proportional distribution within each theme.*

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Table 1 shows how the 132 codes generated through content analysis were distributed across the five themes as follows: Text Comprehension (39.39%), Inference-Making (21.21%), Detail Awareness (18.18%), Emotional Response and Connection (15.15%) and Word Consciousness (6.06%). This distribution indicates that students most frequently displayed behaviours related to basic text comprehension and narrative structure, whereas vocabulary-related awareness was relatively rare.

Within Text Comprehension, the sub-categories of Character (34.62% of this theme) and Event (23.08%) were more prominent than Time, Setting and Main Idea. This suggests that students tended to focus on "who" and "what happened" rather than "when," "where" or the abstract main idea.

The Inference-Making theme (21.21%) was split between Value Identification (53.57% within the theme) and Extraction of Main Message (46.43%), showing that students could produce value-laden comments (e.g., the importance of friendship) but still needed support for consistently uncovering implicit messages.

In Detail Awareness (18.18%), most codes related to Noteworthy Scene (58.33%), such as specific moments of conflict or turning points, while Sequence of Events (41.67%) reflected students' attempts to organise events chronologically.

Emotional Response and Connection (15.15%) captured students' preferences for certain characters (Character Preference, 55%) and their attempts at Empathy/Identification (45%).

Finally, Word Consciousness (6.06%)—entirely composed of New Word/Expression codes—was the least represented theme, suggesting limited spontaneous attention to vocabulary.

Text Comprehension: From Identifying Narrative Elements to Grasping Themes

Across the data set, students demonstrated a relatively strong ability to recognise fundamental narrative elements. For example, Ezgi correctly identified the characters ("Simay and Eslem"), time ("Thursday morning") and main activity ("playing with snowballs"), and labelled the main idea as "friendship." Similarly, other students were able to name characters and describe the setting as a park, a school yard or a ship, and to provide a basic description of what happened.

However, the analysis also showed that Time, Setting and especially Main Idea were less frequently and less elaborately addressed compared to character and event information. In many responses, the time and place were either omitted or expressed in very general terms, and the main idea was often reduced to a single word (e.g., "friendship") without explicit links to specific events in the story.

At the individual level, there was evidence of progression across the two forms. For instance, Ezgi's second-form responses moved beyond naming narrative elements to emphasising the overall theme of "close friendship and snow," indicating a shift from listing details to thematically organised comprehension.

Figure 1. Visual representation of Ezgi's responses to narrative text comprehension forms based on the ChatGPT-generated story

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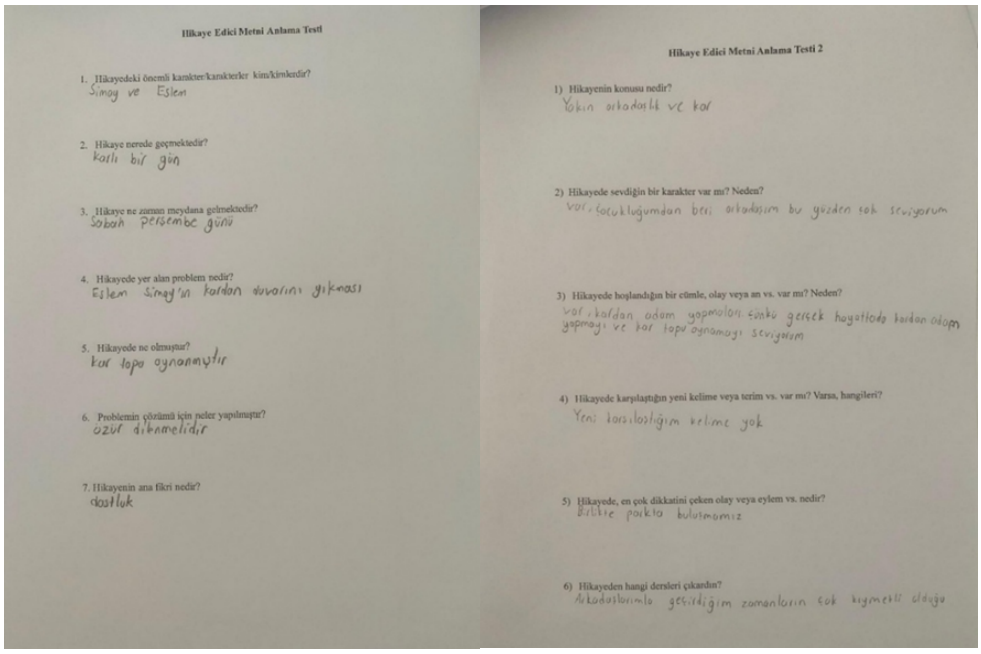

Hikaye Edici Metni Anlama Testi

1. Hikayedeki önemli karakter/karakterler kim/kimlerdir?
Simay ve Eslem

2. Hikaye nerede geçmektedir?
karlı bir gün

3. Hikaye ne zaman meydana gelmektedir?
Sabah perşembe günü

4. Hikayede yer alan problem nedir?
Eslem Simay'ın kardan duvarını yıkması

5. Hikayede ne olmuştur?
kar topu oynanmıştır

6. Problemin çözümü için neler yapılmıştır?
özür dilenmelidir

7. Hikayenin ana fikri nedir?
dostluk

Hikaye Edici Metni Anlama Testi 2

1) Hikayenin konusu nedir?
Yakın arkadaşlık ve kar

2) Hikayede sevdiğin bir karakter var mı? Neden?
Var, çocukluğumdan beri arkadaşım bu yüzden çok seviyorum

3) Hikayede hoşlandığın bir cümle, olay veya an vs. var mı? Neden?
Var, kardan adam yapmaların çünkü gerçek hayatlarda kardan adam yapmayı ve kar topu oynamayı seviyorum

4) Hikayede karşılaştığın yeni kelime veya terim vs. var mı? Varsa, hangileri?
Yeni karşılaştığım kelime yok

5) Hikayede, en çok dikkatini çeken olay veya eylem vs. nedir?
Birlikte parkta bulunmamız

6) Hikayeden hangi dersleri çıkardın?
Arkadaşlarımla geçirdiğim zamanların çok kıymetli olduğu

Figure 1 illustrates Ezgi's responses to the narrative text comprehension forms generated from the ChatGPT-produced story. Her answers show a clear understanding of the fundamental narrative elements, including characters, events, time and setting. Ezgi's progression from surface-level recall in the first form toward more theme-oriented and value-based interpretations in the second form is evident in the visual representation. She identified meaningful scenes, articulated personal connections with the characters and demonstrated emerging skills in inference-making by linking story events to broader ideas such as friendship and shared experiences. Although her word consciousness remained limited, Ezgi's overall engagement reflects a developing ability to construct deeper meaning from AI-generated narratives through both cognitive and emotional processes.

Inference-Making: Emerging but Uneven Higher-Order Understanding

The theme of Inference-Making captured students' attempts to derive meanings that were not explicitly stated. Many students were able to express general values such as "spending time with friends is precious" or "teachers should be treated kindly," indicating that they were beginning to interpret the moral or social messages of the stories.

For example, Ezgi's statement that "the time I spend with my friends is very valuable" shows a value-based inference that connects the narrative to her own social experiences. Similarly, Fatma's shift from a general statement ("We should be good to teachers") to a more story-bound theme ("playing together") suggests increased alignment between the narrative events and the extracted message.

Figure 2. Visual representation of Fatma's responses to the narrative text comprehension forms based on the ChatGPT output

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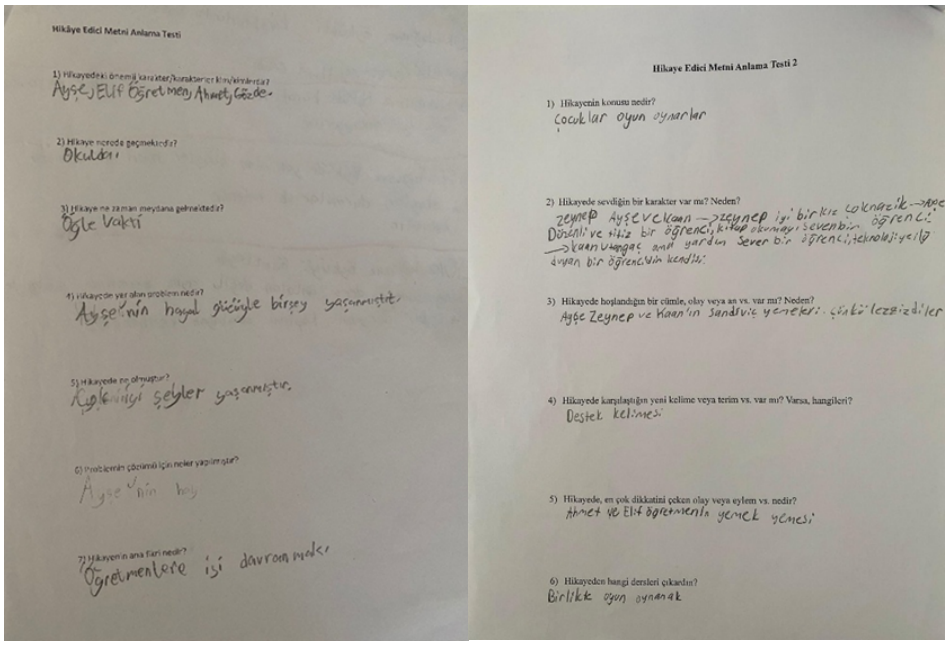

Figure 2 presents a visual summary of Fatma's responses to the narrative text comprehension forms based on the ChatGPT-generated story. The figure shows that Fatma successfully identified key narrative elements and highlighted specific scenes that captured her attention. Her responses reflect an emerging ability to infer simple messages from the story and to justify her character preferences with value-based reasoning. However, the visualisation also indicates limited consciousness of new vocabulary, suggesting that her lexical development remained relatively constrained during the process.

Nonetheless, across the sample, inferential responses were often brief, sometimes formulaic and not always anchored in specific textual evidence. Students could name abstract themes (e.g., friendship, cooperation, overcoming difficulties) but rarely elaborated on how particular scenes or character behaviours supported those themes. This indicates a need for structured support in linking textual details to abstract interpretations.

Detail Awareness: Attention to Scenes, Turning Points and Atmosphere

The Detail Awareness theme revealed that students were able to notice and highlight salient scenes, especially those involving conflict, resolution or vivid imagery. Their responses frequently referenced concrete moments such as:

- "Simay breaking the snow wall"
- "Meeting at the park together"
- "Ahmet and Elif Teacher eating together"
- "Erva hiding under the bridge"
- "The ship surviving the storm without damage"

These examples show that AI-generated stories, with their rich event-driven content, supported students in identifying narrative turning points and key scenes. In several cases, students not only recalled such details but used them to reconstruct the atmosphere of the story, for instance by referring to laughter during snowball fights or shared activities such as football and picnics.

However, students' explanations of event sequence were more variable. Some could correctly order events and indicate cause–effect relations, while others provided partial or fragmented sequences. The second, more structured comprehension form appeared to help students articulate

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event sequences more clearly, suggesting that task design plays a crucial role in eliciting detailed narrative awareness.

Table 2. *Thematic Content Analysis of Fatma's Narrative Text Comprehension Process*

Theme	Sub-Codes	Example Student Expression
Text Comprehension	Time, setting, event, character	"While Teacher Ahmet was sitting on the bench…", "They played games", "Ayça's closest friends…"
Inference-Making	Extracting the main idea, generating meaning	"Being kind to teachers." — "Playing together."
Detail Awareness	Striking scene, event, or expression	"Ahmet and Teacher Elif eating together." — "Ayşe, Zeynep and Kaan eating sandwiches."
Emotional Response and Connection	Preferred character and justification	"Zeynep is a good girl, very polite." — "Kaan is shy but helpful."
Word Consciousness	Newly encountered word	"The word 'destek' (support)."

Table 2 summarises the thematic content analysis of Fatma's responses during the narrative text comprehension process. The data show that she successfully identified key narrative elements such as time, setting, events and characters, demonstrating competence in basic text comprehension. Her inferential statements, though brief, indicate an emerging ability to derive main ideas and generate meaning from events. Fatma also displayed attention to salient details, referencing specific scenes that captured her interest. In terms of emotional engagement, she justified her character preferences with value-based reasoning, reflecting her developing capacity for empathic connection. However, her consciousness of new vocabulary remained limited, suggesting that word consciousness continues to be an area requiring instructional support.

Emotional Response and Connection: From Listing Characters to Empathic Engagement

One of the most notable contributions of AI-supported storytelling to reading experiences was in the area of Emotional Response and Connection. As students engaged with characters who resembled their peers and everyday situations, they gradually moved from merely listing names to evaluating and identifying with characters.

For instance, Ezgi referred to a long-term friendship ("She has been my friend since childhood, so I love her very much"), signalling a strong personal connection between the story and her own life. Fatma described Zeynep as "a nice girl, very polite" and Kaan as "shy but helpful," showing that she could infer character traits and express positive evaluations. Bengü emphasised that she liked all the characters because "they behave well," highlighting a global value judgement about social behaviour.

In some cases, students explicitly expressed identification with a character, as in Önder's statement "Ömer is me," which indicates a high level of projection and empathy. Umut chose Emre because he prepared first-aid materials before the trip, appreciating the character's responsibility and prudence.

At the same time, some responses revealed ambivalence or critical distance. For example, Ahmet both selected a character he liked ("Önder, because he found those who were hiding") and stated that he did not like the roles of the characters overall, suggesting the emergence of a more evaluative and critical stance towards the narrative.

Overall, the findings show that AI-generated stories facilitated affective engagement and helped students relate textual events to their own experiences, especially in the second comprehension form where questions explicitly prompted personal reflection and justification.

Table 3. *Thematic Content Analysis of Önder's Narrative Text Comprehension Process*

Theme	Sub-Codes	Example Student Response
Text Comprehension	Character, time, event, main idea	"All of them"; "night"; "love of friendship"; "friendship"
Inference-Making	Value identification, sensing the main message	"Friendship is sacred"; "the discovery of the lost island"
Detail Awareness	Noteworthy event, sequence of events	"the discovery of the lost island"; "Ömer finding it"
Emotional Response and Connection	Empathy, identification with characters	"All of them, for no reason"; "Ömer is me"
Word Consciousness	New word, word awareness	"None"

Table 3 summarises the thematic patterns observed in Önder's narrative text comprehension process. His responses demonstrate strong recognition of basic story elements and a clear ability to identify value-based messages, particularly around themes of friendship. The data also show that he attended to key events and displayed notable emotional engagement by identifying himself with a character ("Ömer is me"). However, his responses indicate minimal attention to vocabulary, suggesting limited development in word consciousness compared to the other dimensions.

Word Consciousness: A Weak but Developable Dimension

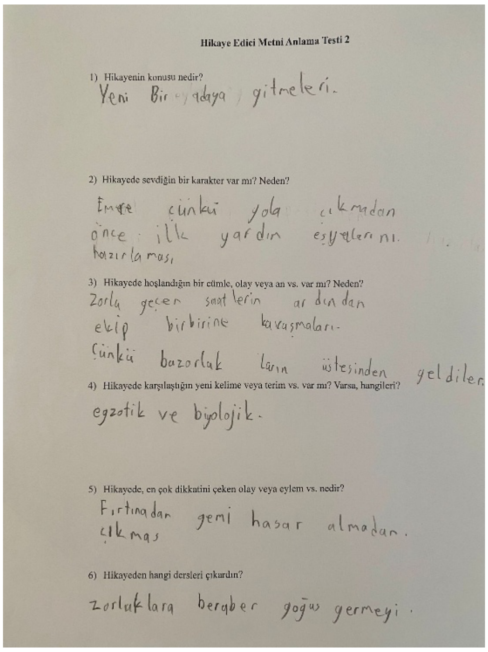
Among the identified themes, word consciousness emerged as the least prominent dimension. A considerable number of students explicitly stated that the stories contained *"no new words,"* which suggests two possibilities: either the linguistic complexity of the AI-generated narratives largely matched their existing vocabulary repertoire, or students did not naturally orient their attention toward lexical novelty during the reading process.

Nevertheless, several noteworthy exceptions indicate that the potential for vocabulary enrichment was present. Fatma, for instance, identified *"destek"* (support) as an unfamiliar or salient term, while Umut highlighted *"egzotik"* and *"biyolojik"* as newly encountered words (see Figure 3). These isolated instances demonstrate that AI-generated texts did occasionally introduce new lexical items and that some students were capable of recognising and articulating these items when appropriately prompted.

The overall scarcity of such responses underscores the importance of structured instructional scaffolding. The findings suggest that vocabulary development within AI-supported reading environments may require more intentional pedagogical integration—for example, guiding students to mark unknown words, infer possible meanings through contextual cues, discuss word usage collectively, and incorporate newly learned vocabulary into their own written productions. Such

strategies could enhance students' metalinguistic awareness and promote deeper engagement with the lexical features of AI-generated narratives.

Figure 3. Visual representation of Umut's responses to narrative text comprehension form 2, generated based on the ChatGPT-assisted analysis


Hikaye Edici Metni Anlama Testi 2

1) Hikayenin konusu nedir?
Yeni Bir adaya gitmeleri.

2) Hikayede sevdiğin bir karakter var mı? Neden?
Emre çünkü yola çıkmadan önce ilk yardım eşyalarını hazırlaması

3) Hikayede hoşlandığın bir cümle, olay veya an vs. var mı? Neden?
Zorlu geçen saatlerin ardından ekip birbirine kavuşmaları. Çünkü bazorlaklarını üstesinden geldiler.

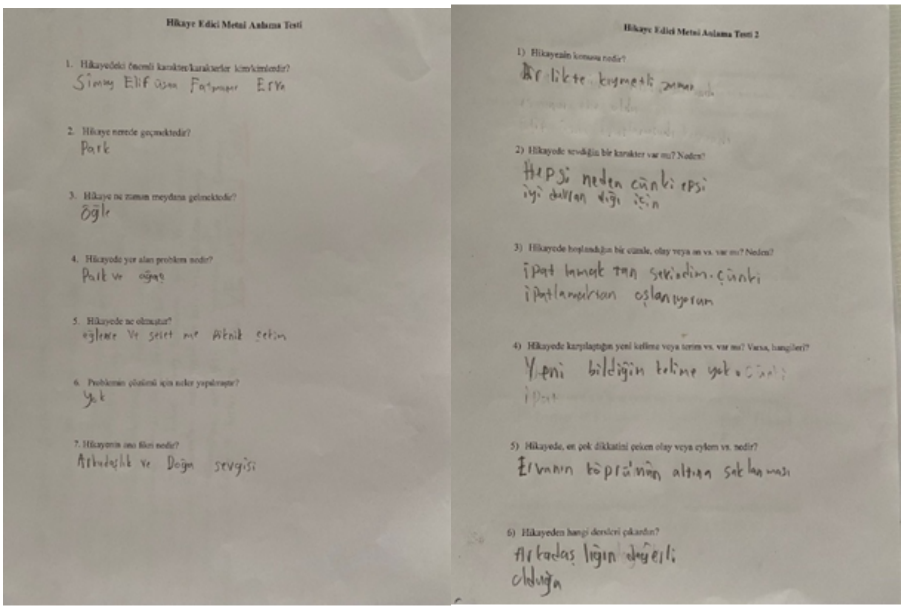
4) Hikayede karşılaştığın yeni kelime veya terim vs. var mı? Varsa, hangileri?
egzotik ve biyolojik.

5) Hikayede, en çok dikkatini çeken olay veya eylem vs. nedir?
Fırtınadan yeni hasar almadan çıkmas.

6) Hikayeden hangi dersleri çıkardın?
zorluklara beraber göğüs germeyi.

Figure 3 illustrates how Umut engaged with key dimensions of narrative understanding, including literal comprehension, inference-making, detail awareness, and emotional connection. The visual layout highlights both the strengths and the developing aspects of Umut's reading processes, providing a concise overview of how AI-assisted prompts supported deeper engagement with the text.

Figure 4. Visual representation of Bengü's responses to the narrative text comprehension forms based on the ChatGPT output


Hikaye Edici Metni Anlama Testi

2. Hikaye nerede geçmektedir?
Park

3. Hikaye ne zaman meydana gelmektedir?
Öğle

6. Problemin çözümü için neler yapılmıştır?
Yok

7. Hikayenin ana fikri nedir?
Arkadaşlık ve Doğa sevgisi

Hikaye Edici Metni Anlama Testi 2

2) Hikayede sevdiğin bir karakter var mı? Neden?
Hepsi neden çünkü hepsi iyi davrandığı için

4) Hikayede karşılaştığın yeni kelime veya terim vs. var mı? Varsa, hangileri?
Yeni bildiğim kelime yok.

5) Hikayede, en çok dikkatini çeken olay veya eylem vs. nedir?
Ervanın köprünün altına saklanması

6) Hikayeden hangi dersleri çıkardın?
Arkadaşlığın değerli olduğu

Figure 4 illustrates Bengü's responses across both narrative text comprehension forms, showing her progression from basic recall of characters, time and events to more elaborative

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interpretations. In Form 2, Bengü demonstrated clearer reasoning, stronger emotional evaluations of characters and increased attention to scene-specific details, particularly those involving conflict and action. This visual comparison reflects her shift toward more purposeful and reflective comprehension when engaging with AI-generated stories.

Table 4. *Findings on Bengü's Reading Skills Assessment*

Skill Area	Form 1	Form 2
Text Comprehension	She clearly stated characters (Simay, Elif Hüsna, Fatma Nur, Erva), setting (park), time (afternoon), event sequence and main idea.	She expressed the theme as 'valuable time together' and explained her favourite characters with reasons.
Inference-Making	She made a meaningful inference such as 'park and tree,' sensing the main message.	Her interpretation 'friendship is valuable' shows understanding of emotional and social meaning.
Emotional Response and Connection	She adopted the characters and evaluated fun and sharing positively.	She said she liked all characters because 'they behaved well.'
Detail Awareness	She stated the problem generally, but the solution was missing.	She wrote a striking detail such as 'Erva hiding under the bridge,' showing focus on details.
Word Consciousness	No direct expression of word awareness in this form.	She stated 'I have no new words,' showing awareness.

Table 4 summarises Bengü's performance across the five key dimensions of reading comprehension. The findings indicate that she demonstrated strong literal understanding of characters, time and events, while also showing the ability to generate value-based interpretations in the inference-making dimension. Her attention to salient narrative details—particularly the discovery scene—suggests developing sensitivity to plot structure. Moreover, Bengü displayed a high level of personal connection and empathy by identifying herself with a character, highlighting the affective engagement fostered by AI-generated stories. However, her responses show limited evidence of word consciousness, indicating that vocabulary-focused support may still be needed.

Discussion and Conclusion

One of the aims of this study was to examine the effects of AI-supported storytelling practices (ChatGPT, Copilot) on fourth-grade students' reading skills. The findings indicate that students showed notable progress in text comprehension, inference-making, detail awareness, and emotional connection, while improvement in the dimension of word consciousness remained limited. This section discusses the results in comparison with the literature on fluent reading and comprehension, highlighting similarities, differences, and implications for instructional practice.

Aşıkcan and Saban's (2021) ten-week action research study demonstrated that instructional practices such as repeated reading, echo reading, choral reading, readers' theatre and poetry- or song-based activities not only reduced reading errors but also enhanced reading speed, accuracy and prosodic competence. These findings align with Schwanenflugel et al.'s (2004) assertion that prosody serves as a mediator between word recognition and comprehension, and with Whalley and Hansen's (2006) findings that prosodic sensitivity is a strong predictor of reading development. Although fluency was not directly measured in the present study, students' progression from surface-level retelling to higher-order thematic and message-based interpretations in the second measurement, as

well as their improved ability to select scene-specific details, suggests that fluency components—particularly multiple readings and the use of model texts supporting prosody—play a role in deepening comprehension.

In this context, structurally coherent AI-generated texts can function as model texts that digitally approximate the prosodic cues offered in multimodal practices such as those used by Aşıkcan and Saban. The rhythmic, stress-based and syntactic markers embedded in such model texts appear to facilitate younger students' movement toward higher-order meaning units. Henkel's (2025) study in Ghana supports this observation, revealing that automatic speech recognition systems and large language models yield comprehension and oral fluency assessments highly consistent with human raters. This highlights the potential of AI-based assessment tools as reliable alternatives in resource-limited educational settings.

Furthermore, the findings on repeated reading effects are consistent with those reported by Pereyra (2025) and Yılmaz (2009), who observed gains in speed, accuracy, and comprehension. Samuels' (1997) theoretical framework also supports these outcomes, proposing that repeated reading automatises word recognition, thereby allowing learners to allocate cognitive resources to higher-level meaning-making processes. Likewise, Dessemontet et al. (2024) reported that repeated reading interventions indirectly enhance comprehension performance. In a similar vein, the experimental study by Elmaadaway et al. (2025) involving Alexa-based AI applications showed significant improvements in students' oral reading fluency and comprehension, and highlighted the motivational benefits of AI tools within the learning process.

Although students in the present study demonstrated clear improvements in higher-order comprehension indicators—such as theme/message extraction and selection of relevant details—the limited development observed in word consciousness is noteworthy. As Pereyra (2025) emphasises, pre-teaching vocabulary plays a crucial role in supporting comprehension. Therefore, while AI-supported storytelling increases engagement and depth of understanding, vocabulary growth may remain limited when targeted word instruction and repeated reading practices are not integrated into the process. Short, cyclic repeated-reading sessions built around AI-generated texts—incorporating semantic relations (synonyms, antonyms, near-synonyms), contextual clues, and example-sentence construction—are thus recommended.

In the action study conducted by Akyol and Çoban Sural (2020) with a student with special educational needs, reductions in reading errors, increases in speed, and improvements in comprehension indicated that technical interventions (word study, repeated reading, syllabication) yield stronger outcomes when combined with motivational factors. Similarly, findings from Borella et al. (2010) and Fielding-Barnsley (2000) emphasise that individual differences in attention, motivation, and strategy use are decisive in reading performance. In the present study, students' predominantly reader-centered responses and active participation during peer feedback and oral reading sessions align with the social-cognitive processes outlined in Guthrie and Wigfield's (2000) motivation model. However, motivational gains that are not accompanied by text-centered strategies (e.g., character mapping, plot-structure diagrams, evidence-comment matching) may lead to limitations in analytical reading outcomes.

Cruz Brotons' (2025) study on a GPT-based teacher support tool reinforces this conclusion, showing that tasks tailored to learners' individual needs and activities integrating emotional awareness provide more inclusive and motivating learning environments. Many studies in the literature similarly emphasise the reciprocal interaction between motivation and achievement (Baker & Wigfield, 1999; Morgan & Fuchs, 2007; Wigfield & Guthrie, 1997). In the present study, students' descriptions of AI-generated texts as "longer, more fluent, coherent and thoughtful," and their statements that they "felt inside the story," suggest that their awareness of textual structure increased and that they approached revision processes more consciously. This indicates a cyclical progression: increased motivation enhances text quality; improved text quality enhances comprehension; and deeper comprehension reinforces motivation. When considered alongside prosodically rich activities (poetry, song, readers'

theatre), this pattern aligns with that described by Aşıkcan and Saban (2021). Additionally, Chango García and Lugmania Borja's (2025) findings show that ChatGPT-based instructional strategies significantly strengthen inferential comprehension, further supporting results from the present study.

In conclusion, students showed substantial progress in theme/message extraction, detail selection, and emotional engagement; however, the limited improvement in word consciousness indicates that deficiencies emerge when vocabulary instruction and repeated reading are not jointly planned. While these contrasts are supported in the literature on meaning-making, fluent reading, and motivational processes, they also indicate that fourth-grade learning outcomes in Turkish require more specialised instructional conditions at the word-level domain.

Overall, AI is becoming embedded in reading instruction not as a temporary novelty but as a permanent component that transforms cognitive and affective processes. This transformation becomes meaningful when it does not diminish but elevates human critical thinking and ethical sensitivity. When teachers connect students with the depth of algorithms and texts, the learning process can move beyond mere transmission of information to a richer environment where the multiple voices of creativity become visible.

Recommendations

Findings from this study suggest that AI-supported storytelling can effectively strengthen students' reading comprehension—particularly in understanding narrative elements, making inferences, recognising key details and forming emotional connections—while vocabulary awareness and other micro-linguistic components show more limited development. Based on these results, several recommendations for instructional practice can be made.

First, instructional tasks should be structured to transform students' aesthetic engagement with AI-generated stories into evidence-based reasoning. Activities such as retelling the story, completing missing paragraphs, proposing alternative endings, adding scenes, or justifying interpretations with textual evidence can help students move beyond surface-level appreciation toward deeper comprehension.

Second, short and targeted micro-skill routines should be incorporated into every reading session. Teachers can adopt a "notice–name–apply" cycle to highlight conjunctions, transitions, punctuation and closing strategies in model texts before asking students to integrate these features into their own work. Vocabulary development should be supported through contextual clue identification, synonym–antonym associations and using new words in multiple contexts.

Third, structured and cognitively demanding prompts should be used to enhance inference making and thematic understanding. Guiding students to explore cause–effect relationships, character motivations and underlying messages encourages the development of higher-order reading skills that extend beyond literal recall.

Fourth, multimodal and scene-based activities can deepen students' detail awareness. Micro-drama, scene reconstruction, sequencing tasks and visual organisers such as storyboards or event maps enable learners to identify narrative structure more effectively and strengthen their ability to track key events.

Fifth, explicit teacher modelling is essential. Think-aloud demonstrations that show how to identify the main idea, extract themes, interpret character actions and follow the narrative structure provide students with a clear cognitive model they can emulate during independent reading.

Sixth, peer interaction should be strategically integrated to support motivation and comprehension. Collaborative retellings, peer discussions and evidence-based peer feedback routines can reinforce text understanding while building social engagement around reading tasks.

Finally, vocabulary development ought to be supported through repeated reading cycles and targeted instruction. AI-generated stories alone were not sufficient for fostering word consciousness; therefore, short repeated-reading routines and mini-glossary activities centred on important or unfamiliar words can help students internalise vocabulary more effectively. Encouraging students to integrate culturally meaningful elements into AI prompts can further strengthen comprehension by fostering personal and contextual relevance.

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High School Teachers' Perceptions About the Use of Artificial Intelligence in Teaching Processes

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Abstract

This study aims to examine high school teachers' perceptions of artificial intelligence (AI) technologies and how these perceptions differ based on various demographic and professional variables. The research, conducted using a quantitative research methodology, employed the "Artificial Intelligence Perception Scale" as a data collection tool. A total of 355 teachers with diverse professional experiences and demographic characteristics participated in the study.The findings indicate that high school teachers generally have a positive perception of AI technologies. While no significant difference was found in AI perceptions based on gender, variables such as school type and prior technological training were observed to influence perceptions. Teachers working in private schools demonstrated higher perceptions of AI compared to those in public schools. Moreover, teachers who had received training on AI exhibited more positive attitudes toward these technologies. The results emphasize the need for increasing training programs and improving infrastructure to enhance teachers' perceptions of AI technologies. Recommendations include strengthening technological integration, raising awareness of AI, and enhancing teachers' digital skills.

Keywords: Artificial Intelligence, Teacher Perceptions, Educational Technologies, Demographic Variables, Technological Integration.

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Introduction

Russell and Norvig (2020) describe artificial intelligence as systems designed to replicate human cognitive functions, including decision-making, learning, problem-solving, and language processing. Today, AI has led to significant transformations in various sectors, including healthcare, finance, automotive, security, agriculture, law, and, particularly, education (Goel, 2021). While AI undertakes various functions such as accelerating diagnostic processes in healthcare, improving risk management in finance, and preventing cyber threats in security, it also has the potential to transform teaching processes in education (Köse, 2022).

In the field of education, AI is a technology used to enhance students' learning processes and to personalize teaching methods. AI provides personalized content by considering students' learning speeds and styles, allowing them to learn at their own pace and according to their interests. Additionally, automated assessment systems enable the rapid and accurate evaluation of tests and exams, thereby reducing teachers' workload. AI-supported teaching systems help teachers monitor students and manage classrooms more effectively. By analysing student performance, AI can identify areas where students struggle and adjust teaching strategies accordingly. AI can be utilized in various areas of education, including the following:

1. *Personalized Learning Experience:* AI is a highly effective tool in delivering content tailored to individual learning needs. *Example Applications:*

    - *Duolingo:* Analyzes students' language learning speeds and levels, offering personalized lessons and exercises.

    - *DreamBox:* Develops individualized learning pathways for mathematics education, providing a customized learning experience for each student.

    - *Knewton:* Analyzes students' learning behaviors and suggests tailored content to address learning gaps.

2. *Automated Assessment Systems:* AI facilitates the automatic evaluation of tests, exams, and other assessments, reducing teachers' workload while enabling students to receive immediate feedback. *Example Applications:*

    - *Gradescope:* Provides automated grading for written exams and assignments.

    - *Turnitin:* Checks the originality of student work while analyzing written content for errors and providing feedback.

    - *Socrative:* Quickly evaluates multiple-choice, short-answer, and open-ended questions, generating reports for teachers.

3. *Teacher Support Systems:* AI assists teachers in classroom management and monitoring students' learning processes. *Example Applications:*

    - *Classcraft:* Enhances classroom management by gamifying student behaviors.

    - *Smart Sparrow:* Allows teachers to customize lesson content based on students' individual needs.

    - *Edmodo:* Helps teachers interact more effectively with students and manage classroom tasks efficiently.

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4. *Performance Analysis and Development Strategies:* AI analyses students' strengths and weaknesses, providing data to improve the teaching process. *Example Applications:*

    - *IBM Watson Education:* Analyses student data and provides teachers with detailed reports on students' progress.

    - *Quizizz:* Evaluates students' exam results and learning trends, suggesting content for weaker areas.

    - *Kidaptive:* Tracks students' learning behaviors and offers personalized recommendations to support their development.

AI-based learning platforms analyze students' strengths and weaknesses, providing each student with a personalized learning experience. AI not only reduces teachers' workload but also enables them to conduct a more effective and efficient teaching process. For instance, while Duolingo analyzes students' language learning levels to provide personalized lessons, DreamBox creates individualized learning paths in mathematics education to meet students' unique needs. In assessment processes, Gradescope supports automated grading of written exams and assignments, whereas Turnitin checks student work for originality and provides feedback. Among teacher support systems, Classcraft enhances classroom management through gamification, and Edmodo facilitates better teacher-student interaction and classroom task management. Furthermore, IBM Watson Education analyses student progress and provides detailed performance reports to teachers, aiding in identifying weaknesses and formulating development strategies. These AI-supported systems enhance the effectiveness and efficiency of educational processes by offering solutions tailored to both students' and teachers' needs.

AI applications, which are created for cognition and problem-solving based on algorithms and knowledge base, can effectively support and augment educators' and learners' abilities in teaching and learning. (Wang et al., 2024). The use of AI technologies in education has the potential to reshape both classroom interactions and teaching strategies. As Gökmen (2021) states, AI enriches students' learning experiences, making them more active and engaged. With AI-supported tools, teachers can personalize students' learning processes, creating more efficient and effective learning environments. However, despite AI's potential benefits in education, teachers have varying perspectives on this technology. While some educators believe that AI will enhance student success by personalizing learning processes, others fear that AI may reduce the role of teachers (Yılmaz, 2020). The integration of AI into core teaching responsibilities, such as student assessment, feedback provision, and classroom management, has raised concerns among some educators regarding the potential ambiguity in their professional roles. These concerns may increase teachers' hesitancy to incorporate AI technologies into classroom settings, thereby limiting AI's effectiveness in education. Consequently, teachers' perceptions of and attitudes toward AI will play a crucial role in shaping the future of this technology in education.
Various factors influence teachers' attitudes toward AI, including demographic variables, professional experience, technological literacy, personal beliefs and attitudes, institutional and environmental factors, perceived benefits, and potential risks. Teachers' general attitudes toward technology, their professional backgrounds, their ability to use technology, and their instructional strategies directly impact their perspectives on AI.

An important issue affecting teachers' perceptions of AI in education is ethical concerns. Specifically, teachers have concerns about whether AI-based student assessment systems operate fairly and whether student data privacy is protected (Köse, 2022). The security and confidentiality of student data are significant factors that limit the use of AI technologies in education. The ongoing debate about AI's role in education revolves around whether this technology will replace teachers. Research indicates that AI cannot replace teachers but rather functions as a supportive tool (Öztürk, 2023). AI can play a significant role in enhancing teachers' professional efficiency by assisting in lesson planning, analysing student performance, and optimizing classroom management strategies. Secondary

school teachers' attitudes toward AI play a decisive role in determining the effectiveness of this technology in education.

Purpose of The Study

Studies on the use of artificial intelligence (AI) technologies in education have been increasing in recent years. AI is integrated into the education system in various areas, such as personalizing teaching processes, analysing student performance, and supporting teachers' pedagogical practices (Holmes et al., 2021). Research on the role of AI in education indicates that these technologies reduce teachers' workloads, personalize learning processes, and serve as a crucial tool for enhancing student achievement (Luckin, 2018; Zawacki-Richter et al., 2019).

Teachers' perceptions of AI technologies are considered one of the most critical factors in integrating these technologies into education. Studies have shown that teachers' attitudes toward AI technologies are influenced by various factors such as professional experience, digital literacy level, and technological infrastructure (Mousavinasab et al., 2021). Some studies conducted in Turkey indicate that teachers generally have moderate to high awareness of AI technologies; however, their active use of these technologies in the classroom remains low (Dündar & Akkuş, 2022; Yaman, 2023).

Regarding gender differences, research suggests that teachers' attitudes toward AI technologies are generally similar, but female teachers may experience higher anxiety about using technology compared to their male counterparts (Köse, 2022). Furthermore, the relationship between professional experience and AI technologies is complex. Some studies suggest that senior teachers tend to approach AI usage with more scepticism, although individual technological awareness and continuous professional development opportunities may alter this perspective (Tekinaslan & Güner, 2009).

Research on school type as a variable indicates that teachers working in private schools tend to have a more positive attitude toward AI technologies than their counterparts in public schools. The primary reasons for this include private schools' generally superior technological infrastructure and greater exposure of teachers to such technologies (Çelik & Şahin, 2021). Additionally, it has been emphasized that teachers who have received training on AI technologies demonstrate higher awareness and more positive attitudes compared to those who have not received such training (Doğan, Doğan & Çetinkaya, 2023).

Although there are numerous studies on AI usage in education in the existing literature, research specifically examining high school teachers' perceptions of AI remains limited. In the context of Turkey, there is a need for more data on the factors influencing teachers' attitudes toward AI usage. This study aims to contribute to understanding teachers' perceptions of AI technologies in education. While the literature contains many studies on teachers' adoption of technology, research examining the impact of AI technologies on teachers' perceptions is relatively scarce. A detailed examination of the variables influencing high school teachers' attitudes toward AI applications will provide a significant contribution to addressing this knowledge gap.

This study will serve as a guide for policymakers, educators, and researchers supporting the integration of AI technologies into educational processes. Identifying teachers' perceptions of AI technologies will contribute to the development of training programs, the establishment of incentive mechanisms, and the support of teachers in their professional development. Additionally, examining the effects of variables such as school type, professional experience, gender, and AI education on teachers' perceptions will help shape strategic planning in this field.

This research aims to examine the perceptions of secondary school (high school) teachers regarding AI use in education across different variables. Accordingly, the study seeks to answer the following research questions:

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1. Do teachers' perceptions of AI usage significantly differ based on gender?

2. Do teachers' perceptions of AI usage significantly differ based on their professional experience?

3. Do teachers' perceptions of AI usage significantly differ based on the type of school they work at?

4. Do teachers' perceptions of AI usage significantly differ based on their postgraduate education status?

5. Do teachers' perceptions of AI usage significantly differ based on whether they have received training in AI?

6. Do teachers' perceptions of AI usage significantly differ based on whether they integrate AI applications into their lessons?

By examining how teachers' perceptions of AI usage vary according to various socio-demographic and professional variables, this study aims to achieve its research objectives.

Methodology

Research Model

In this study, the causal-comparative model was used to examine the perceptions of high school teachers regarding the use of artificial intelligence (AI) in their teaching processes. The causal-comparative model is a method used to investigate causal relationships between existing variables. This model aims to identify cause-and-effect relationships by comparing differences between naturally occurring groups without any intervention by the researcher on independent variables. In this study, the causal-comparison method was used to examine the cause–effect relationships between variables. The causal-comparison method is defined as an approach that aims to reveal the possible effects and outcomes among variables (Balcı, 2015).

In this context, the dependent variable of the study is the perceptions of high school teachers regarding the use of AI in their teaching processes. The study examines various independent variables that may influence these perceptions. The independent variables include demographic and professional factors such as teachers' subject area, age, gender, postgraduate education status, whether they have received AI training, whether they use AI in their lessons, the type of school they work at, their professional experience, and whether they have participated in volunteer-based training.

Within the model, the impact of existing differences among naturally occurring groups on AI-related perceptions was analysed. As Karasar (2015) states, "since such studies are based on comparing naturally formed groups, they do not involve experimental intervention; however, they allow for assessments of potential causal relationships between variables" (p. 77). Therefore, based on the study's findings, it is aimed to draw conclusions regarding the determinants of teachers' perceptions of AI usage and the sources of differences in these perceptions.

Population and Sample

The population of this study consists of high school teachers working across Turkey. No regional or school type limitations were imposed, and teachers from both public and private high schools were included in the research population. The broad scope of the population allows the findings to represent various educational settings and enables a more comprehensive evaluation of teachers' perceptions of artificial intelligence (AI).

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The sample of the study consists of 355 high school teachers selected through a random sampling method. These teachers were chosen from different subject areas, age groups, and levels of professional experience, making the diversity of the sample an essential factor in enhancing the reliability of the study. The selection of participants from different provinces contributed to the geographical balance of the study, increasing the generalizability of the findings.

An analysis of the gender distribution of the 355 teachers in the sample revealed that 51.3% (n=182) were female, while 48.7% (n=173) were male. These proportions indicate that the sample has a balanced gender composition.

Regarding professional experience, the distribution of teachers based on their years of service is as follows:

- Teachers with 0-5 years of experience: 27.3% (n=97)
- Teachers with 6-10 years of experience: 17.5% (n=62)
- Teachers with 11-15 years of experience: 18.6% (n=66)
- Teachers with 16-20 years of experience: 16.1% (n=57)
- Teachers with 21 or more years of experience: 20.6% (n=73)

These data indicate that the teachers participating in the study have a broad range of professional experience. Notably, teachers with 0-5 years of experience represent the largest proportion. The balanced distribution of professional experience levels within the sample allows the study to capture the perspectives of teachers at different career stages, leading to more comprehensive and reliable results.

For data collection, an online survey (scale) was administered via Google Forms. The survey was designed to measure teachers' perceptions of AI usage in their teaching processes and was structured to enable participants to express their views objectively. The online data collection method provided accessibility advantages, given that the participants were from different provinces, facilitating the inclusion of a wide range of respondents.

Data Collection Instrument

The data for this study were collected using the Teachers' Perceptions of Artificial Intelligence Use in Education Scale, developed by Burhan Üzüm, Mithat Elçiçek, and Ata Pesen (2024). Each item in the scale includes a five-point Likert-type response format to measure attitude levels. The response options, ranging from the most negative to the most positive, are as follows:

"Strongly disagree, Disagree, Partially agree, Agree, Strongly agree" (1-5).

The reliability coefficient (Cronbach's alpha) of the scale was calculated as 0.87, indicating high reliability. Additionally, the construct validity coefficients were determined as follows:

- 0.82 for the *Teaching Perception* subdimension,
- 0.80 for the *Learning Perception* subdimension,
- 0.81 for the *Ethical Perception* subdimension

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Data Collection

The Teachers' Perceptions of Artificial Intelligence Use in Education Scale served as the primary data source for this study. The data collection process was conducted via Google Forms, and responses were obtained from 356 teachers. The survey link was shared across various social media platforms, teacher groups, and online educational communities. Additionally, teachers were contacted directly via email, where they were provided with instructions for completing the survey.

To ensure diversity, efforts were made to include teachers from different subject areas and school types. The study was analyzed in line with the research objectives and sub-problems, and the findings were presented in statistical analyses and tables to provide a clearer understanding of teachers' perceptions of AI use in education.

Data Analysis

Teachers' perceptions of AI use were examined based on demographic variables. Before proceeding with the analysis, normality tests were conducted to determine the distribution of the data. The Kolmogorov-Smirnov test was found to be significant ($p < .05$). However, since this test alone may not be sufficient, descriptive statistics and visual analyses were also considered.

The mode (M = 55), median (Mdn = 57), and arithmetic mean (M = 55) values, along with skewness (0.535) and kurtosis (0.606) coefficients, indicated a near-normal distribution (George & Mallery, 2010). Additionally, the histogram graph confirmed the suitability of using parametric tests (Tabachnick & Fidell, 2013).

Accordingly:

- Independent Samples t-Test was used for binary variables.
- One-Way ANOVA was applied for variables with three or more categories.

These statistical tests were chosen as the most appropriate methods based on the data structure and statistical power.

FINDINGS

The findings obtained for each sub-problem are presented in this section.

Findings on the Relationship Between Teachers' Gender and Their Perceptions of AI Use

Table 1. *Relationship Between Teachers' Gender and Their Perceptions of AI Use*

Variable	Gender	N	$\overline{X}$	ss	Levene's Test (F; p)	t	p
Artificial Intelligence	Female	182	54,8	9,05	2,816; p>.05	-1,167	,244
	Male	173	56,06	10,5			

When examining teachers' perceptions of AI use based on gender, it was found that the AI perception scores of male and female teachers did not differ significantly ($p > .05$). The mean AI perception score for female teachers was 54.8 (SD = 9.05), while for male teachers, it was 56.06 (SD = 10.5). The independent samples t-test analysis revealed no statistically significant difference between the two groups ($t = -1.167$, $p = .244$).

This finding indicates that there is no significant difference in teachers' perceptions of AI use based on gender. It can be concluded that gender is not a determining factor in teachers' perceptions of AI use.

Findings on the Relationship Between Teachers' Professional Experience and Their Perceptions of Artificial Intelligence Use

Table 2. *Relationship Between Teachers' Professional Experience and Their Perceptions of Artificial Intelligence Use*

Variable	**Professional Experience**	**n**	$\overline{X}$	**ss**	**Levene's test; p**	**F**	**p**	**Difference between groups (Scheff)**
Artificial Intelligence	A. 0-5	97	55,6	9,3	1,136; p>.05	0,492	,741	B<A
	B. 6-10	62	54	8,7				B<C
	C. 11-15	66	56	8,9				C<D
	D. 16-20	57	56	8,81				E<D
	E. 21 and overs	73	55	11,4				

This study examines the relationship between teachers' years of professional experience and their perceptions of artificial intelligence (AI) use. The analysis results indicate that teachers' perceptions of AI use vary significantly across different experience groups.

According to the results of the variance analysis, teachers with 0-5 years of professional experience exhibit the highest average perception of AI use, whereas those with 21 or more years of experience have lower mean scores. However, the obtained F value (F=0.492, p=0.741) does not indicate a statistically significant difference (p>0.05). This suggests that there is no meaningful relationship between teachers' professional experience and their perception of AI use.

Nevertheless, the Scheffé test, conducted to determine intergroup differences, reveals specific distinctions. Notably, teachers with 6-10 years of professional experience have significantly lower perceptions of AI use compared to those with 0-5 years of experience (B<A). Similarly, teachers with 11-15 years of experience demonstrate higher AI perception levels than those with 6-10 years of experience (B<C). Likewise, teachers with 16-20 years of experience exhibit a higher perception level than those with 11-15 years of experience (C<D). Finally, teachers with 21 or more years of professional experience have significantly lower AI perception levels compared to those with 16-20 years of experience (D<E). These findings indicate that while teachers' perceptions of AI use undergo certain variations as their professional experience increases, there is no overall significant relationship between professional experience and AI perception.

Findings on the Relationship Between School Types and Teachers' Perceptions of Artificial Intelligence Use

Table 3. *Relationship Between Teachers' School Type and Their Perceptions of Artificial Intelligence Use*

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Variable	School Type	N	$\overline{X}$	ss	Levene's test (F; p)	t	p
Artificial Intelligence	Public School	286	55,2	9,6	,0155; p>.05	-,863	,389
	Private School	69	56,3	9,06			

The independent samples t-test results indicate a t-value of -0.863 and a significance level of p = 0.000. The obtained p-value ($p < 0.05$) demonstrates a statistically significant difference between the two groups.

Further analysis conducted to identify the source of this difference reveals that private school teachers have significantly higher perception scores regarding AI use compared to teachers working in public schools ($p < 0.05$).

Findings on the Relationship Between Teachers' Graduate Education Status and Their Perceptions of Artificial Intelligence Use

Table 4. *Relationship Between Teachers' Graduate Education Status and Their Perceptions of Artificial Intelligence Use*

Variable	Graduate Education Status	n	$\overline{X}$	ss	Levene's test; p	F	p	Difference between Groups (Scheff)
Artifical Intelligence	A. No	216	55,1	9,6	,027; p>.05	3,963	020	B<A B<C
	B. Master Degree	115	54,9	9,1				
	C. Doctorate	24	60,7	9,2				

According to the results of the variance analysis, a significant difference was found in teachers' perceptions of AI use based on their graduate education status ($F=3.963$, $p=0.020$, $p<0.05$). The Scheffé test, conducted to determine the source of this difference, indicates that teachers with a master's degree have significantly higher perceptions of AI use compared to those with only a bachelor's degree (B<A). Similarly, teachers with a doctoral degree exhibit even higher AI perception scores than those with a master's degree (B<C).

These findings suggest that as teachers' educational attainment increases, their perceptions of AI use become more positive. In particular, teachers with doctoral-level education appear to have greater awareness of AI-related topics.

Findings on the Relationship Between Teachers' AI Training Status and Their Perceptions of AI Use

Table 5. *Relationship Between Teachers' AI Training Status and Their Perceptions of AI Use*

Variable	Status of receiving Artificial Intelligence Education	N	$\overline{X}$	ss	Levene's test (F; p)	t	p
Artificial Intelligence	Participated	74	59,1	9,5	,132; p>.05	3,526	,000
	Not participated	281	54,4	9,3			

An independent samples t-test was conducted to determine whether there was a significant difference in teachers' perceptions of AI use based on their participation in AI training. The analysis results indicate that teachers who have received AI training ($\bar{X}$ = 59.1, SD = 9.5) have significantly higher perception scores regarding AI use compared to those who have not participated in such training ($\bar{X}$ = 54.4, SD = 9.3) [t(353) = 3.526, p < .05].

According to Levene's test results, homogeneity of variance between the groups was confirmed (F = 0.132; p > .05). This finding suggests that teachers who have received AI training hold more positive perceptions toward this technology.

Findings on the Relationship Between Teachers' Use of AI Tools in Class and Their Perceptions of AI Use

Table 6. *Relationship Between Teachers' Use of AI Tools in Class and Their Perceptions of AI Use*

Variable	Artificial Intelligence Usage Status	N	$\bar{X}$	ss	Levene's Test (F; p)	t	p
Artifical Intelligence	Yes	165	57,2	9,1	,735; p>.05	3,396	,001
	No	190	53,8	9,6			

An independent samples t-test was conducted to determine whether there was a significant difference in teachers' perceptions of AI use based on their use of AI tools in class. The analysis results indicate that teachers who use AI tools in their lessons ($\bar{X}$ = 57.2, SD = 9.1) have significantly higher perception scores regarding AI use compared to those who do not use these tools ($\bar{X}$ = 53.8, SD = 9.6) [t(353) = 3.396, p < .05].

According to Levene's test results, homogeneity of variance between the groups was confirmed (F = 0.735; p > .05). This finding suggests that teachers who incorporate AI tools into their lessons tend to have more positive perceptions of AI technology.

Findings on the Relationship Between Teachers' Participation in Volunteer-Based Training and Their Perceptions of AI Use

Table 7. *Relationship Between Teachers' Participation in Volunteer-Based Training and Their Perceptions of AI Use*

Variable	Participation in Voluntary Training	N	$\bar{X}$	ss	Levene's Test (F; p)	t	p
Artificial Intelligence	Participated	296	55,5	9,3	2,133; p>.05	,237	,813
	Not participated	59	55,1	10,6			

An independent samples t-test was conducted to examine the relationship between teachers' participation in volunteer-based training and their perceptions of AI use. The analysis results indicate that there is no statistically significant difference in AI perception scores between teachers who participated in volunteer-based training (N = 296, $\bar{X}$ = 55.5, SD = 9.3) and those who did not participate (N = 59, $\bar{X}$ = 55.1, SD = 10.6) (t = 0.237, p = .813).

According to Levene's test results, the assumption of homogeneity of variance was met (F = 2.133, p > .05). Therefore, teachers' participation in volunteer-based training does not appear to be a determining factor in their perceptions of AI use.

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Discussion, Conclusion And Recommendations

In this study, high school teachers' perceptions of artificial intelligence (AI) technologies were examined in the context of various demographic and professional variables, and the findings were evaluated in light of the existing literature. The results indicate that, in general, teachers have a positive perception of AI technologies. This finding suggests a high potential for teachers to adopt technology-oriented educational paradigms. The findings are consistent with previous research that highlights the role of teachers in the integration of technological innovations into education (Maden & Maden, 2016; Geçgel, Kana & Eren, 2020).

The findings reveal that teachers' perceptions of AI are generally high. The fact that the mean AI attitude scores correspond to the "agree" level reflects teachers' potential to adopt this technology and their positive approach to its implementation in educational processes. The literature frequently emphasizes that individuals who embrace the effects of technological innovations on teaching processes are also likely to have high awareness of AI applications (Doğan, Doğan & Çetinkaya, 2023). This situation indicates that teachers should not only be considered as implementers in digital transformation processes but also as innovative leaders who embrace new solutions.

According to the research findings, no significant difference was found in AI perceptions based on gender. This result suggests that AI technologies are perceived and adopted equally by teachers, regardless of gender. Similar results have been obtained in studies by Dumlupınar & Arslan (2023) and Köse (2022), which emphasize that attitudes toward such technologies are more related to educational policies and opportunities for implementation rather than individual awareness. However, the differences in technology usage levels between male and female teachers cannot be explained solely by technological literacy levels; these differences may also be influenced by socio-cultural and institutional factors.

Analyses conducted in the context of professional experience indicate that there is no significant difference in teachers' perceptions of AI technologies based on their years of experience. The low impact of experience duration on technological awareness or perceptions suggests that training on technology use may be a more critical factor than experience itself. This finding aligns with some studies in the literature, indicating that perceptions of technology use are primarily shaped by individual technology awareness and access opportunities rather than professional experience (Tekinaslan & Güner, 2009).

The study also reveals significant differences in AI perceptions based on the type of school in which teachers work. It was found that teachers working in private schools have higher AI perceptions compared to their colleagues in public schools. This finding suggests that infrastructure facilities and institutional support for technological integration in private schools may have a positive impact on teachers' perceptions. Technology-oriented educational opportunities offered in private schools may increase teachers' awareness and willingness to adopt these technologies.

Additionally, teachers who have received training on AI exhibit more positive attitudes compared to those who have not. This finding highlights the importance of both practical and theoretical knowledge transfer in shaping teachers' perceptions of technological innovations. The effective use of AI tools increases teachers' confidence in these technologies and positively influences their perceptions of educational processes.

According to the results, no significant difference was found between teachers' AI attitudes and their internet usage duration. However, it was observed that teachers who actively use technology are more familiar with AI technologies and can integrate them more easily into classroom settings. This finding underscores the necessity of improving digital literacy and providing teachers with greater support in this area.

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In conclusion, the research findings indicate that high school teachers have positive perceptions of AI technologies; however, these perceptions may vary based on individual and institutional variables. Based on these findings, several recommendations are presented to reinforce teachers' positive perceptions of AI technologies and ensure their more effective integration into educational processes.

Recommendations

1. *In-Service Training Programs for the Integration of AI Technologies into Educational Processes*

Comprehensive in-service training programs should be organized to enhance teachers' knowledge of AI technologies and enable their effective use. These programs should cover areas such as the application of AI in education, its integration into lesson content, and ethical frameworks for its use. Emphasizing practical training in particular will increase teachers' confidence in technology and contribute to their classroom practices.

2. *Development of Policies to Encourage AI Use*

Institutional policies should be developed to encourage teachers to integrate AI technologies into their educational processes. In this context, incentive mechanisms should be established for teachers who develop AI-based instructional materials or effectively utilize these technologies in classroom applications. Recognizing and rewarding successful AI implementations and sharing best practices will enhance teachers' motivation toward these technologies.

3. *Awareness-Raising Initiatives on AI Technologies*

Awareness-raising activities should be organized to inform teachers about the role and potential of AI technologies in education. Academic conferences, workshops, and seminars should be conducted to keep teachers updated on current developments in AI. Additionally, facilitating teachers' access to scientific publications, guidance documents, and best practices will contribute to increasing AI literacy.

4. *Enhancing Digital Literacy Skills and Increasing Access to Technology*

Strengthening teachers' digital literacy skills is essential for the effective use of AI technologies. Accordingly, infrastructure improvements should be made to facilitate teachers' access to digital tools, and the use of AI-supported educational technologies should be promoted in schools. Providing the necessary technological infrastructure, particularly in public schools, will be a key factor in fostering a more positive perception of AI.

5. *Development of Institutional Support Policies*

To support the integration of AI into the education system, strategic policy documents and action plans should be developed by relevant ministries and educational institutions. Including AI-based course content in curricula will enhance teachers' competencies in this field, enabling them to implement pedagogical adaptations more effectively.

In conclusion, ensuring the sustainability of teachers' positive attitudes toward AI technologies and integrating these technologies into the education system requires comprehensive in-service training, incentive policies, and awareness-raising initiatives. Strategies developed in this direction will enhance teachers' awareness and proficiency in AI, making significant contributions to the digital transformation process in education.

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