Perspectives of Primary School Teacher Candidates on the Use of Artificial Intelligence in Inclusive Education

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Makale Geliş Tarihi:02/07/2025 *Makale Kabul Tarihi:10/07/2026*

DOI: 10.35675/befdergi.1732537

Abstract

This study investigates how primary school teacher candidates perceive the integration of artificial intelligence (AI) technologies in inclusive education. Using a qualitative research design, in-depth interviews were conducted with 15 teacher candidates through a semi-structured interview form. Thematic analysis revealed that the participants viewed AI as a tool to support personalised learning, provide immediate feedback, and enhance student motivation. However, they also expressed significant concerns regarding data privacy, content reliability, unequal access, and ethical implications. In addition, the participants emphasised the lack of pedagogical and technical training necessary for the effective implementation of AI in classroom settings. The findings highlight the need to revise teacher education programmes in order to support the responsible, equitable, and effective use of AI in inclusive educational environments. Overall, the study points to the importance of a comprehensive and ethically grounded approach to the integration of AI in education.

Keywords: *Artificial intelligence, digital ethics, inclusive education, personalised education, teacher candidates*

Sınıf Öğretmeni Adaylarının Kaynaştırma Eğitiminde Yapay Zeka Kullanımına Yönelik Görüşleri

Öz

Bu çalışma, sınıf öğretmeni adaylarının yapay zeka (YZ) teknolojilerinin kaynaştırma eğitimi kapsamında kullanımına ilişkin görüşlerini incelemektedir. Nitel araştırma desenine uygun olarak, 15 öğretmen adayıyla yarı yapılandırılmış görüşme formu aracılığıyla derinlemesine görüşmeler gerçekleştirilmiştir. Tematik analiz sonucunda katılımcıların YZ'yi; bireyselleştirilmiş öğrenmeyi destekleyen, anlık geri bildirim sağlayan ve öğrenci motivasyonunu artıran bir araç olarak gördükleri belirlenmiştir. Bununla birlikte; veri gizliliği, içerik güvenilirliği, erişim eşitsizliği ve etik yansımalar konusunda önemli kaygılar da dile getirilmiştir. Ayrıca katılımcılar, YZ'nin sınıf içi uygulamalarda etkili biçimde kullanılabilmesi için gerekli pedagojik ve teknik eğitimin yetersiz olduğunu vurgulamıştır. Bulgular,

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Kaynak Gösterme: Kazanasmaz, A. & Gülay, A. (2026) Perspectives of primary school teacher candidates on the use of artificial intelligence in inclusive education, *Journal of Bayburt Education Faculty, 21*(51), 1000-1025.

kaynaştırma eğitiminde YZ'nin sorumlu, adil ve etkili kullanımını destekleyecek şekilde öğretmen yetiştirme programlarının gözden geçirilmesi gerektiğini göstermektedir. Sonuç olarak çalışma, eğitimde YZ entegrasyonuna yönelik kapsamlı ve etik temelli bir yaklaşımın önemine işaret etmektedir.

Anahtar Kelimeler: *Bireyselleştirilmiş eğitim, dijital etik, kaynaştırma eğitimi, sınıf öğretmeni adayları, yapay zeka*

Introduction

Artificial intelligence (AI) is an interdisciplinary field concerned with enabling computers to solve complex problems in ways that resemble human intelligence (Kumar & Sharma, 2024). According to UNICEF (2021), AI refers to machine-based systems that can interact with their environment in pursuit of specific goals, adapt their behaviour through learning, make autonomous decisions in physical or digital contexts, and generate predictions and recommendations. AI is commonly classified into two main types: narrow AI and general AI. Narrow AI refers to systems designed to perform specific tasks within limited domains, whereas general AI refers to a hypothetical form of AI with generalised human cognitive abilities capable of performing a wide range of intellectual tasks (Gabsi, 2024). Rapid technological developments, particularly the integration of AI into educational settings, are reshaping the organisation of educational practices. AI is increasingly being used to support teaching, strengthen educators' digital literacy, inform data-driven instructional decision-making, and foster more personalised learning experiences (Zhang & Zhang, 2024). In educational contexts, AI-based tools can provide personalised learning opportunities, monitor student progress, and offer targeted support. They can also influence instructional planning, the development of learning materials, and student assessment. At the same time, however, the growing use of AI in education brings important ethical concerns to the fore, including issues related to accuracy, bias, data privacy, and copyright. For this reason, teachers need the knowledge and skills to critically interrogate AI-generated outputs, evaluate their pedagogical appropriateness, align their use with learners' needs and intended learning outcomes, and uphold ethical principles in AI use (Borgonovi et al., 2025; Miao & Holmes, 2023). In this respect, the effective integration of AI depends largely on how well pre-service teachers are prepared to understand, adopt, and apply these technologies in their future classrooms (Miao & Holmes, 2023; Zhang & Zhang, 2024; Zhao et al., 2022). Therefore, investigating teacher candidates' perspectives on AI is important, as their knowledge, self-efficacy, and beliefs about using AI in future classrooms can offer valuable insight into how teacher education programmes can better prepare them for the effective use of AI in education (Gatlin, 2023). This issue is particularly significant because AI has been associated with the development of more inclusive and accessible learning environments through personalised learning and responsiveness to diverse student needs (Zhang & Zhang, 2024). Understanding these perspectives may also contribute to the design of adaptive and personalised

learning environments that better accommodate learner diversity (Zawacki-Richter et al., 2019).

Inclusive education is broadly understood as an educational approach that values learner diversity and is grounded in equity and fairness. In its social dimension, educating students with special educational needs in mainstream classrooms can create opportunities for peer interaction, friendship, and participation in school life; however, such participation may also involve social risks when adequate support is not provided (Ainscow, 2020; Koster et al., 2009). Within this broader framework, the Turkish policy context refers to this practice as education through inclusion/integration. This approach is defined as enabling students with special educational needs to continue their education alongside their peers in the same educational settings through necessary arrangements, adaptations, and support services (Özel Eğitim ve Rehberlik Hizmetleri Genel Müdürlüğü [ÖERHGM], 2022). Its effective implementation requires supporting teachers in the use of methods, materials, and inclusive practices adapted to students' special educational needs across different educational contexts (Yazıcıoğlu, 2020; Hnatiuk et al., 2022). These changing educational demands further highlight the importance of strengthening competencies in the use of AI-related technologies to address diverse learner needs and to support accessibility and inclusion (Pagliara et al., 2024).

AI literacy can be understood as the interplay of knowledge, skills, and attitudes, with ethical awareness forming the foundation for the critical, responsible, and effective use of AI systems (Renkema et al., 2025). It is also defined as the set of competencies needed to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool in everyday and work-related contexts (Long & Magerko, 2020). Ng et al. (2021) conceptualise AI literacy in four dimensions: knowing and understanding AI, using and applying AI, evaluating and creating AI, and addressing ethical issues. Large language models may help reduce teachers' workload and support personalised learning and instructional planning; however, they may also produce biased outputs, require continuous human oversight, and demand critical thinking and fact-checking because of their limitations and brittleness. This suggests that their effective use in inclusive classrooms depends on teachers' AI literacy and professional judgement (Kasneci et al., 2023).

Despite the increasing use of AI technologies in education, the existing literature remains predominantly technical in focus. Relatively limited attention has been paid to the pedagogical and ethical dimensions of AI integration in education (Zawacki-Richter et al., 2019). Teacher candidates may not yet be sufficiently prepared for AI-integrated education, particularly in relation to AI fundamentals, ethics, and meaningful classroom integration (Guan et al., 2025). In inclusive education contexts, further attention is needed to strengthen institutional policies and teacher preparation curricula that support the adoption and use of AI in inclusive classrooms (Adigun et al., 2025). Investigating how teacher candidates conceptualise AI in inclusive learning

environments may therefore help address an important gap at the intersection of pedagogical, ethical, and teacher-preparation dimensions of AI in education.

Improving teacher candidates' understanding of AI applications that may support learners with special educational needs is important for strengthening AI integration in inclusive education. Teacher education programmes may therefore need to include more explicit preparation related to AI fundamentals, ethics, and classroom use. Such preparation may help future teachers not only use AI tools more effectively, but also critically evaluate their appropriateness and implications in inclusive classroom settings (Guan et al., 2025; Adigun et al., 2025; Zhang & Zhang, 2024).

Although technical studies on the integration of AI into education are undoubtedly valuable, greater attention should be given to the pedagogical preparation of future teachers for the use of AI in diverse classroom contexts. Inclusive education requires adequately prepared teachers, as they are key actors in its implementation, and training in special needs education is associated with more positive attitudes towards inclusion and a greater willingness to implement inclusive practices (de Boer et al., 2011). Similarly, research on AI literacy suggests that teachers play a central role in the integration of AI into school curricula and that teacher education is necessary to support the critical and effective use of AI in educational practice (Casal-Otero et al., 2023).

While research on educators' views on AI in education is growing, recent studies conducted in Türkiye have primarily focused on in-service teachers rather than teacher candidates (Küçükkara et al., 2024; Aksakal et al., 2024; Seyhan, 2024; Kurtdede Fidan & Kayar, 2025). Examining teacher candidates' perspectives may provide valuable insights for teacher education policy and curriculum development (Coşkun, 2024). For this reason, the present study aims to examine primary school teacher candidates' perspectives on the integration of AI technologies into inclusive education from multiple dimensions.

This study aims to explore, in depth, the perspectives of primary school teacher candidates regarding the integration of AI technologies into inclusive education settings. In line with this aim, the study seeks to answer the following research questions:

1. What are the perceived advantages and disadvantages of AI for inclusive education?

2. Which AI tools and applications used in inclusive education are identified by primary school teacher candidates?

3. What concerns and reservations do primary school teacher candidates have about integrating AI tools into inclusive education practices?

4. What support and training needs do primary school teacher candidates identify regarding the use of AI applications in inclusive education?

5. How do primary school teacher candidates view the contribution of AI to the learning processes of students in inclusive education settings?

6. What key features and areas for improvement are needed to enhance the effective integration of AI in inclusive education?

Method

This study investigates the perceptions and views of primary school teacher candidates regarding the use of AI technologies in inclusive education settings. This section describes the methodological framework of the study, including the qualitative research design, participants, data collection procedures, and data analysis process.

Design

A qualitative research approach was employed to explore how primary school teacher candidates perceive the integration of AI technologies into inclusive education settings. Qualitative methods are particularly well suited to the exploration of perceptions and experiences, as they aim to understand participants' views in their natural contexts and to generate in-depth insights (Creswell & Poth, 2018; Tisdell et al., 2025). Within this framework, a descriptive phenomenological approach was adopted in order to gain a deeper understanding of how primary school teacher candidates perceive the integration of AI in inclusive educational settings. Phenomenology focuses on capturing participants' lived experiences and interpretations of a particular phenomenon (Patton, 2014). Accordingly, this study seeks to uncover how pre-service teachers conceptualise the role of AI technologies in supporting students with special educational needs. The findings are expected to provide practical implications and actionable recommendations for the improvement of teacher education programmes.

Participants

The study was conducted with 15 primary school teacher candidates enrolled in the Faculty of Education at a state university. In order to examine the phenomenon in depth, participants were selected through purposive sampling. Among purposive sampling strategies, criterion sampling was employed. Criterion sampling aims to include participants who meet predetermined criteria relevant to the purpose of the study. Accordingly, individuals who were expected to provide information directly related to the main aim and sub-objectives of the research were selected (Palinkas, 2014; Patton, 2014).

The criteria were determined in line with the research questions and based on possible differences in participants' pedagogical background and course experiences

concerning inclusive education. The specified criteria included being a fourth-year student in the primary school teaching programme and having completed the compulsory inclusive education course in the programme. In addition, for third-year students who had not yet taken the inclusive education course, having completed the elective course Children at Risk and Their Education was also accepted as a criterion. The content of this course includes issues such as children at developmental risk and supports teacher candidates' awareness of disadvantage and risk contexts.

The research data were collected during the final month of the academic year, specifically in the last two weeks of May 2025. The sample size was evaluated with reference to data richness and the principle of data saturation. In qualitative research, data saturation refers to the point at which no new codes, categories, or themes emerge from additional interviews (Guest et al., 2006). In this study, the analysis conducted after the interviews indicated that the final interviews largely repeated existing codes and themes and did not generate new ones. Therefore, it was concluded that the data obtained from 15 primary school teacher candidates were sufficient for the purposes of the study and for achieving phenomenological depth. The demographic characteristics of the participants are presented in Table 1.

Table 1.
Participants' Demographic Information

Primary School Teacher Candidate (N=15)	N	%
Sex/Gender		
Male	6	40
Female	9	60
Age		
20	2	13
21	7	47
22	3	20
23	3	20
Class		
3rd Year	6	40
4th Year	9	60

Measurement Tool and Data Collection

A semi-structured interview technique was employed in this study. In preparing the interview questions, the fundamental principles of qualitative research were taken into consideration. During the development of the interview form, the relevant literature

was reviewed on topics such as perceptions of and attitudes towards AI tools in inclusive education, the purposes and use of AI tools in the classroom, their perceived benefits, limitations and risks, ethical and privacy awareness, perceptions of competence, and the use of AI tools to support students in inclusive settings. Based on this review, an initial pool of questions was created. The interview questions were then revised in line with the main aim and sub-objectives of the study (Yıldırım & Şimşek, 2021).

To establish the content validity of the interview form, expert opinions were obtained from five experts, including one expert in measurement and evaluation and four experts in special education. Based on this feedback, one draft interview question was removed, questions with similar content were combined to reduce unnecessary repetition, the order of the questions was rearranged to improve the flow of the interview, some conceptual expressions were simplified, and brief explanations were added to enhance comprehensibility. Following the expert review, the revised interview questions were piloted with two fourth-year primary school teacher candidates who were not included in the participant group. The purpose of the pilot interviews was to assess the clarity of the questions, the coherence of the interview flow, and the appropriateness of the interview duration (Creswell & Poth, 2018; Patton, 2002; Yıldırım & Şimşek, 2021). After these interviews, which lasted an average of 32 minutes, further revisions were made to improve clarity and reduce question length, and the interview form was finalised. Accordingly, the interview form was considered appropriate for the purpose of the study.

Before the interviews were conducted, ethical approval was obtained from the Social and Human Sciences Ethics Committee of Recep Tayyip Erdogan University (meeting date: 24/04/2025; decision no: 2025/176). All interviews were conducted face-to-face in a suitable setting on campus where participants could express themselves comfortably. The interviews were carried out by the first author on a voluntary basis, and participants were informed that they could withdraw from the study at any time without providing any reason. Before the interviews began, participants were informed about the purpose and procedures of the study. They were also asked to read and sign an informed consent form authorising the collection of demographic information and the audio recording of the interviews. The interviews lasted between 22 and 32 minutes, and all interviews were audio-recorded.

Data Analysis

All interviews were audio-recorded using a digital device after participants had been informed about the study and had provided their consent. The recordings were then transcribed verbatim for analysis. To ensure participant confidentiality, pseudonyms in the form of codes such as K1, K2, and K3 were assigned. The accuracy of the transcripts was checked by one of the researchers through repeated listening to the audio recordings. Audio files and transcripts were stored securely in password-protected files accessible only to the researchers. Verbatim transcription is considered

a rigorous step in qualitative research, as it helps preserve participants' narratives as closely as possible to their original form (Braun & Clarke, 2012).

In the data analysis process, Braun and Clarke's (2012) thematic analysis approach was employed. In line with this approach, the analysis was conducted in six phases: familiarisation with the data, generation of initial codes, identification of themes, review of themes, naming of themes, and reporting. An inductive approach was adopted, and the themes were developed from the data. The coding process was carried out independently by both researchers, after which the codes and themes were compared and a consensus was reached on a shared thematic structure. Inter-coder reliability was calculated using the formula proposed by Miles and Huberman (1994) and was found to be 98%. This rate exceeds the 90% threshold commonly recommended for qualitative research and indicates a high level of consistency in the coding process. One coding disagreement was resolved through consultation with a third expert in qualitative research. The researchers then re-evaluated the revised themes and sub-themes and finalised them. In line with the research design, care was taken during the interviews to ensure that the researchers' own preconceptions did not influence the process. During the analysis stage, the researchers met regularly to review the data while remaining faithful to the meanings expressed by the participants. To minimise data loss and enhance the quality of the analysis, all data management and analysis procedures were conducted using MAXQDA 24 software.

Validity and Reliability

To ensure rigour in qualitative research, the criteria of credibility, transferability, dependability, and confirmability were adopted (Lincoln & Guba, 1985; Merriam, 2009). To enhance credibility in the present study, the interview recordings were transcribed verbatim, and the findings were supported by direct participant quotations. The coding process was conducted independently by two researchers, and data saturation was taken into consideration. To support transferability, the data collection and analysis procedures were described in detail. In addition, the demographic characteristics of the participants were presented comprehensively. The data collection process was carried out systematically through a semi-structured interview form, and dependability was supported by reporting the analysis process in detail. To establish confirmability, all findings were grounded in the participants' perspectives, and the interpretations were made in an impartial manner.

Results

This study examined primary school teacher candidates' views on the use of AI technologies in the education of students with special educational needs. Qualitative data obtained through semi-structured interviews were analysed using thematic analysis, which resulted in the identification of six main themes. The themes identified were personalised learning and motivation; limitations and risks; teaching support

with digital applications; ethical, dependency and data security risks; the need for education and awareness surrounding AI; and inclusive and interactive learning environments.

Personalised Learning and Motivation

Many participants emphasised that AI technologies have considerable potential to enhance the personalisation of instruction for students in inclusive settings and to increase their learning motivation. The subthemes that constitute the personalised learning and motivation theme are providing instant, meaningful feedback (N = 7); personalised educational content (N = 6); attracting attention through visual and auditory stimuli (N = 6); and contribution to the preparation of the IEP (N = 3).

Table 2.
Subthemes Contributing to Personalised Learning and Motivation

Subtheme	N	%
Providing instant, meaningful feedback	7	47
Personalised educational content	6	40
Attracting attention through visual and auditory stimuli	6	40
Contribution to the preparation of the IEP	3	20

Seven participants highlighted the subtheme of providing instant, meaningful feedback, making it the most frequently mentioned subtheme. Participants stated that AI tools could reinforce learning by providing immediate corrections to students' mistakes. Participant K6 emphasised the impact of this on the learning process, stating, "*AI can provide students with instant feedback, enabling them to identify and correct their mistakes immediately.*" K5 also supported this view, saying, "*When you provide instant feedback, students can reinforce their learning. This is possible with AI.*"

Six participants referred to personalised educational content, stating that AI could deliver such content to students with special needs by taking their individual differences into account. Participant K12 highlighted the personalisation capabilities of AI, stating that "*Content tailored to each student's learning style, level, and interests can be delivered more easily.*" Participant K3 emphasised that educational adaptation can be achieved through AI, stating, "*Every student is different. AI can provide personalised content.*" Similarly, K4 stated, "*Preparing and presenting individualized content for each student has become easier with artificial intelligence,*" thereby emphasising the facilitating role of AI in differentiated instructional planning.

Six participants mentioned the use of visual and auditory stimuli to attract attention, noting that engaging and motivating materials can support learning, particularly for students with short attention spans. Participant K6 explained, "*Using*

AI to make lessons more fun will make students more eager to learn," while K12 highlighted the contribution of AI to learning, stating that "*The use of appropriate colour tones and sounds with AI tools can extend a child's attention span*," thereby emphasising the importance of sensory elements supported by AI.

Three participants highlighted the subtheme of contributing to the IEP preparation process, noting that teachers could receive support from AI to help them prepare IEPs more systematically. K15 described this process as a supportive tool, stating that "*Primary school teachers can receive help from AI when preparing IEPs.*" Participant K1 similarly stated, "*I received support from artificial intelligence while preparing an IEP as an assignment. I had some shortcomings, and it helped me correct them*," indicating that AI can assist teacher candidates in identifying gaps and improving the quality of IEP preparation.

Limitations and Risks

Participants highlighted various structural issues, including information security, access conditions, and content accuracy that need to be addressed in order to ensure the effective use of AI-supported applications in education. Four subthemes emerged within this theme: data security and privacy concerns (13 responses), risk of inappropriate content and redirection (10 responses), spatial and technological access inequality (8 responses), and the lack of empathy in AI (7 responses).

Table 3.
Subthemes Contributing to Limitations and Risks

Subtheme	N	%
Data security and privacy concerns	13	87
Risk of inappropriate content and redirection	10	67
Spatial and technological access inequality	8	53
The lack of empathy in AI	7	47

Thirteen participants highlighted data security and privacy concerns, making this the most frequently mentioned subtheme. Participants expressed concern about the safety of collecting and storing children's personal data. K3 stated, "*There might be legal and ethical problems, and that data and privacy security must be as good as possible. Families are asked for permission for people under 18, but sometimes they are not given all the information*," pointing to potential legal and ethical concerns related to informed consent. K12 similarly emphasised the sensitivity of personal data, stating, "*I think data privacy is important; health data is very sensitive. It is very important that this data is kept secure.*" Likewise, K2 remarked, "*I do not think that students' personal information is secure in AI systems. I am afraid that there may be data leaks*," reflecting concerns about the risk of unauthorised access to sensitive student data.

Ten participants referred to the risk of inappropriate content and redirection to unsuitable websites. They also stated that the information provided by AI systems may not always be pedagogically appropriate or ethically suitable. K9 pointed to the lack of safe content control, stating, "*We cannot know whether the content is sexually explicit. If a child asks about the word suicide, they might get many different answers, which could confuse them.*" K5 also referred to the risks associated with uncontrolled redirection, stating, "*If children can easily access information, they might come across things that are not true.*" Similarly, K6 stated, "*When a student conducts a search, the recommended websites may contain content that is not age-appropriate, including images, videos, or any material available on the site,*" further emphasising participants' concerns about children's exposure to inappropriate online content.

Eight participants mentioned that some schools in rural areas do not have the same level of access to technology as schools in urban areas because of limited internet connectivity and insufficient technological resources. K7 referred to this issue by stating, "*Technology can be weak in some areas, which can lead to inequality in access.*" K9 also emphasised geographical differences, stating, "*Children in villages cannot use artificial intelligence if there is no internet.*"

Seven participants stated that AI lacks empathy. Participants regarded the inability of AI to establish empathy and emotional connection, which teachers can provide, as an important limitation, particularly when working with students with special needs. K1 clearly expressed this limitation by stating, "*AI does not truly love. It can create fake love... it needs the ability to empathise.*" K10 also highlighted the potential harm this may cause in teaching, stating, "*Since it cannot establish empathy, its guidance may harm the child.*"

Teaching Support with Digital Applications

Participants in the study reported that AI technologies and digital tools can support teachers in a variety of ways during the teaching process. The analysis identified four subthemes: applications tailored to specific requirements (N = 12), AI-supported lesson planning (N = 9), Web 2.0-based creative learning tools (N = 8), and digital storytelling and personalisation (N = 7).

Table 4.
Subthemes Contributing to Teaching Support with Digital Applications

Subtheme	N	%
Applications tailored to specific requirements	12	80
AI-supported lesson planning	9	60
Web 2.0-based creative learning tools	8	53
Digital storytelling and personalisation	7	47

Twelve participants highlighted applications tailored to specific requirements, and the ability to differentiate AI-supported content according to student needs was seen as an advantage. K2 stated, "*Applications that provide content tailored to the specific needs of a child with dyslexia may be possible with AI,*" while K10 pointed to the possibilities of personalisation, stating, "*AI systems that recommend content based on the student's needs would be very useful.*" Another participant, K9, stated, "*Adaptations can be made for every child, whether or not they are in inclusive education, according to the way they learn most easily,*" emphasising the potential of AI to facilitate individualised instruction for diverse learners.

Nine participants referred to AI-supported lesson planning, emphasising its usefulness, particularly in terms of activity suggestions, time savings, and differentiation. K14 explained this contribution by stating, "*I utilise AI tools such as ChatGPT during the preparation of lesson plans. It suggests different activities.*" Similarly, K13 highlighted the practical value of this support, stating, "*I utilise AI to formulate my weekly schedules. This approach has proven to be both time-efficient and a means of diversifying activities.*"

Eight participants referred to Web 2.0-based creative learning tools. Their statements suggested that digital tools used in teaching, including Web 2.0 platforms such as Canva and Padlet, supported teachers' material development and enhanced student engagement during lessons. Although some participants also mentioned AI-supported digital applications, the examples provided under this subtheme mainly referred to Web 2.0-based tools. K11 stated, "*We utilise tools such as Canva and Padlet in the production of lesson materials; classroom interaction is increasing,*" while K7 emphasised the increase in interaction in teaching environments by saying, "*Thanks to Web 2.0 tools, students are participating in activities, and group work is becoming easier*."

Digital storytelling and personalisation was mentioned by seven participants, who noted that motivation could be increased through original storylines that particularly appeal to students. K10 described a student-centred process, stating, "*I create customised stories for students using the Storyboard That app, and they choose their own characters.*" Meanwhile, K6 emphasised the value of visual storytelling, saying, "*I design original stories that capture students' interest using video narration in Clipchamp.*"

Ethical, Dependency, and Data Security Risks

Participants in the study noted that the integration of AI technologies within educational settings is associated with a range of potential ethical, emotional, and security concerns. The analysis yielded three subthemes: personal data security (N=11), screen and technology addiction and social isolation (N=9), and surface learning and knowledge pollution (N=8).

Table 5.
Subthemes Contributing to Ethical, Dependency and Data Security Risks

Subtheme	N	%
Personal data security	11	73
Screen and technology addiction and social isolation	9	60
Surface learning and knowledge pollution	8	53

Personal data security was highlighted by eleven participants, who expressed concerns about privacy violations that could arise from entering student information and data into AI systems. K8 expressed doubts about data processing procedures, stating, "*Any information entered into AI may be recorded; children's information must be protected.*" Similarly, K12 drew attention to the security of pedagogical data, stating, "*Children's personal data, behavioural characteristics, and performance information remain in the system; the misuse of this information is risky*."

Screen and technology addiction and social isolation were mentioned by nine participants, who pointed out that excessive exposure to AI could lead students to withdraw from social interaction and become psychologically isolated. K9 stated, "*Children who are overly attached to AI may have difficulty communicating with their friends,*" while K15 emphasised that this risk may also be reflected in the classroom environment, stating, "*If the teacher does not provide proper guidance, the student may become isolated from their classmates and may not want to go to school.*"

Surface learning and knowledge pollution were raised by eight participants. Within this subtheme, participants suggested that AI tools might encourage memorisation and direct-response habits rather than deep learning, and that contradictory or unverified information could disrupt the learning process. K4 stated, "*If a child asks a question to AI and receives a direct answer, learning does not occur*," suggesting that opportunities for critical thinking may be weakened. Participant K14 also highlighted concerns about the reliability of information, stating, "It gives different answers to the same question, which may mislead the student."

The Need for Education and Awareness Surrounding AI

Participants indicated the need for increased training for teacher candidates, teachers, and parents in order to support the effective integration of AI technologies into educational environments. The thematic analysis identified three subthemes: AI education at university level (N = 10), practical courses and teacher training (N = 9), and awareness and information for parents (N = 7).

Table 6.
*Subthemes Contributing to AI Training and Awareness Requirement*s

Subtheme	N	%
AI education at university level	10	67
Practical courses and teacher training	9	60
Awareness and information for parents	7	47

As indicated by ten participants, the need for teacher candidates to acquire technical and pedagogical knowledge related to AI during their university education was emphasised. Participant K14 advocated the inclusion of AI in the curriculum, stating that "*AI related elective courses must be made available within education faculties.*" K7 stated, "*We are not receiving any training related to AI, which will cause difficulties for us in the future,*" indicating that this deficiency may negatively affect professional competence. In addition, K2 stated, "*There is no content in our education on this subject. For example, I would have liked to take such a course. I would have liked to use artificial intelligence effectively when working as a teacher,*" further underscoring the perceived need for formal AI training during teacher education.

Practical courses and teacher training were mentioned by nine participants, who emphasised the need for continuous and practice-oriented in-service training on the effective use of AI and digital tools. K8 highlighted the importance of experience-based training by stating, "*If seminars on AI are given in in-service training, teachers will gain practical knowledge.*" K5 pointed to the need for training that addresses both technical and pedagogical aspects, stating, "*Training courses on AI and digital tools should be organised, especially on how to use them with children with special needs.*"

Seven participants emphasised the importance of awareness and information for parents. These views suggested that parents also need to be informed so that they can provide appropriate guidance to children who encounter AI at home. K12 clearly expressed this need, stating, "*Parents are not familiar with AI, so they need to be educated so that they can guide their children properly.*" K3, on the other hand, drew attention to the effects of this gap on children, stating, "*When children use these applications at home, parents cannot guide them because they lack information.*"

Inclusive and Interactive Learning Environments

Participants stated that AI-supported applications can provide not only academic support but also social, emotional, and interactive learning environments for individuals with special needs. Three subthemes were identified under this theme: interactive and engaging contents (N = 10), adaptability to different types of special needs (N = 8), and support for social and emotional development (N = 7).

Table 7.
Subthemes Contributing to Inclusive and Interactive Learning Environments

Subtheme	N	%
Interactive and engaging contents	10	67
Adaptability to different types of special needs	8	53
Support for social and emotional development	7	47

Ten participants referred to interactive and engaging contents. Participants indicated that the use of visually and aurally enriched content, gamified activities, and interactive structures enhanced student participation in the classroom environment. As illustrated by K6, this contribution was reflected in the statement that "*AI visuals, videos, and colourful materials attract students' attention.*" K11 also emphasised the importance of this aspect in increasing motivation, stating, "*The utilisation of gamification and interactive activities has been demonstrated to enhance children's engagement in classroom settings.*"

Adaptability to different types of special needs was expressed by eight participants. Participants indicated that the ability of AI to adapt content according to different types of need is important. K2 emphasised the importance of designing for individual differences, stating, "*It is of paramount importance to be able to produce content or materials according to the type of need.*" K13 drew attention to the potential for customisation, stating that "*The system should automatically provide differentiated content according to the student's area of difficulty*."

Support for social and emotional development was mentioned by seven participants, who stated that AI could be integrated into applications that support students' social skills. K14 emphasised multifaceted development, stating, "*Children should not only gain academic skills but also social skills; AI can provide support in this area.*" K10 highlighted social learning opportunities in technological environments, stating, "*Applications that support social-emotional aspects, such as interacting with avatars to build empathy and discussing a topic, are important*."

The findings indicate that primary school teacher candidates generally evaluate the use of AI technologies in the education of students with special needs positively. Participants stated that AI offers a range of advantages, including the personalisation of learning processes, support for teaching activities, and enhanced interaction. However, they also highlighted a number of multidimensional concerns, including data security, ethical risks, access inequalities, and information reliability. Furthermore, they emphasised the need to raise awareness among teacher candidates and parents regarding the effective use of these technologies, as well as the need for structured training in AI literacy within teacher education processes. The thematic findings obtained in this context are discussed in detail in the following section in relation to current discussions in the literature.

Discussion

The findings reveal that primary school teacher candidates view AI technologies as a potentially supportive tool in the education of students with special needs. Participants highlighted advantages such as personalised learning, teaching support, and increased interaction, while also expressing concerns about data security, access inequality, and ethical risks. Overall, the findings suggest that the integration of AI into educational environments requires a multidimensional assessment, which's broadly consistent with the existing literature.

The participants in this study are future teachers. In this respect, the data obtained may provide useful implications for teacher education policies and curriculum design, particularly given the importance of curriculum content and internship experiences in shaping teacher candidates' understanding of inclusive practices (Massouti, 2021). At the same time, it is important to understand how teacher candidates conceptualise the role of AI in inclusive education across ethical, pedagogical, and technical dimensions. This is because recent research suggests that teacher candidates may need stronger preparation in AI fundamentals, ethics, and the meaningful integration of AI into educational practices (Guan et al., 2025; Zhang & Zhang, 2024). The findings of this study indicate that AI may support inclusive teaching through personalised support, adaptive learning opportunities, and increased access to learning, while also raising ethical concerns that require careful consideration. In this respect, the findings are broadly consistent with literature emphasising AI's role in adaptive and personalised learning, support for diverse learners, and the ethical and human-agency challenges associated with its educational use (Doğan et al., 2023; Holmes & Tuomi, 2022; Zhang & Zhang, 2024). Taken together, these findings suggest that teacher education programmes could benefit from incorporating AI literacy, ethical awareness, and application-oriented content into the preparation process for inclusive practices.

Participants emphasised that the use of AI applications in educational settings may involve significant risks, particularly in relation to data security, content accuracy, and access inequalities. These findings are consistent with the literature highlighting concerns about privacy and ethical use, the reliability of algorithms, and the accuracy of AI-generated content in education (Ifenthaler et al., 2024; Bobrytska et al., 2024). In contexts where resources are limited, restricted access to AI tools may undermine equal opportunities and deepen the digital divide (Roshanaei et al., 2023; Zhang & Zhang, 2024). Some participants also believed that AI may lack human-specific qualities such as empathy, which may be considered a pedagogical risk, particularly in communication with students who require special education. In light of these findings, greater investment in technical infrastructure and stronger emphasis on AI literacy, ethical awareness, and the critical evaluation of AI-supported content may help support teacher education in a more inclusive, reliable, and equitable way (Ifenthaler et al., 2024; Zhang & Zhang, 2024).

Primary school teacher candidates participating in the study indicated that AI tools and digital applications could support the preparation of materials tailored to individual differences, facilitate lesson planning, and contribute positively to teaching processes by increasing student participation. Students with special needs may be supported through more flexible teaching practices shaped by their goals and learning preferences (Courduff et al., 2016). This finding is consistent with research showing that AI can support teaching, contribute to inclusive and accessible learning environments, and help educators identify students' learning styles and implement more personalised interventions (Zhang & Zhang, 2024). It is also in line with research suggesting that AI offers personalised and adaptive learning opportunities, while teacher candidates still need stronger preparation for its meaningful integration into education (Guan et al., 2025). The pedagogical value of these tools depends largely on teachers' digital competence. König et al. (2020) emphasise that teachers' digital competence plays an important role in helping them adapt their practices to technology-enhanced teaching environments. However, other research suggests that teachers' digital skills are often limited and that training should combine methodological and educational strategies in addition to technical knowledge (Sánchez-Cruzado et al., 2021). These findings suggest that teacher education programmes should adopt a holistic approach that encompasses AI and digital literacy, pedagogical practice, and inclusive education.

Although participants reported that AI and AI tools could support teaching processes and contribute to inclusive education, they also noted that this technology carries certain risks. In particular, their concerns about personal data security, excessive screen exposure, social isolation, and misinformation highlight the need for a critical and ethical approach to AI integration. These findings are similar to the literature emphasising that the use of AI technologies in education should be addressed not only from a technical perspective but also in relation to its ethical and broader consequences (Holmes & Tuomi, 2022; Akgun & Greenhow, 2022). Participants' concerns also point to the importance of helping educators understand how AI-related risks may affect students' learning experiences and educational relationships, especially in terms of data privacy, fairness, and responsible use (Eden et al., 2024). For these reasons, the ethical concerns expressed by participants indicate that teacher education programmes should address not only technical skills but also ethical awareness, critical evaluation, data protection, and equitable implementation. AI can be adopted more responsibly through a holistic approach supported by professional development, data protection, and digitally inclusive implementation (Akgun & Greenhow, 2022; Eden et al., 2024).

The primary school teacher candidates participating in the study emphasised that comprehensive preparation is needed for the effective use of AI in education, yet such preparation has not been meaningfully integrated into teacher education, which may limit the critical and informed use of AI tools. This is broadly consistent with the literature indicating that teachers and teacher candidates require preparation in the

pedagogical use of AI, ethical awareness, and the contextualised application of AI in classroom settings (Ng et al., 2023; Guan et al., 2025; Zhao et al., 2022). Another issue highlighted by participants was parents' limited awareness of AI. This suggests that AI literacy should be addressed more comprehensively, extending beyond teacher candidates to include families as well. As teacher candidates gain professional experience, their views and beliefs about teaching may change over time (Ng et al., 2010). Therefore, the views expressed in this study may reflect perceptions and expectations rather than actual classroom practices, which limits the direct applicability of the findings to real-world contexts. Taken together, these findings point to the importance of broader AI awareness and more supportive conditions for its use in inclusive educational settings (Adigun et al., 2025; Zhao et al., 2022). Overall, the findings suggest that teacher education requires a more holistic approach.

Participants indicated that AI tools could make important contributions to inclusive educational environments in areas such as visual and auditory support and personalisation. These findings are broadly consistent with the literature suggesting that AI-enhanced tools can create more inclusive and engaging learning environments by adapting content delivery to individual needs and preferences, thereby enhancing interaction and participation (Ng et al., 2023; Holman et al., 2024). Some participants' comments that these tools could strengthen students' self-confidence partially align with the findings of Adeleye et al. (2024), who suggest that adaptive systems providing personalised support and immediate feedback can increase self-confidence and self-efficacy. However, achieving this in a sustainable way may depend on teachers receiving guidance on how to design and adapt pedagogically and ethically appropriate AI-supported learning experiences, particularly for students with special needs (Miao & Holmes, 2023; Holman et al., 2024). The limited parental awareness reported by participants also suggests that the use of AI should involve other educational stakeholders, including parents as well as teachers (Eden et al., 2024). Taken together, these findings indicate that AI can support learning experiences that address not only cognitive but also social and emotional needs. However, this potential depends on a multidimensional approach to AI literacy that includes teachers, parents, and other educational stakeholders.

Conclusion and Suggestions

This study aimed to reveal primary school teacher candidates' views on AI technologies and to offer a multidimensional perspective on the potential of these technologies in inclusive education. Participants stated that AI has the potential to make significant contributions in areas such as personalised learning, teaching support, feedback, and student motivation. They also expressed concerns regarding issues such as data security, access inequality, ethical risks, and teacher competencies. The findings indicate that AI applications have considerable potential to support inclusive learning environments. However, they also show that the effective, safe, and

equitable integration of this technology requires teacher education, appropriate use of AI, digital literacy, and broader social awareness.

The integration of AI into inclusive education appears to require a holistic approach that goes beyond technical use and takes pedagogical, ethical, and social dimensions into account. In this study, AI-based applications refer to AI-built tools, AI-supported applications, digital tools developed with AI features, and broader technology-based tools. In this context, the development of comprehensive training programmes aimed at strengthening prospective teachers' knowledge, attitudes, and skills may be important for the success of future inclusive education practices.

This study is limited in terms of the generalisability of its findings, as it was conducted with 15 primary school teacher candidates enrolled at a single state university. In addition, the fact that the participants had not yet gained professional experience constitutes an important limitation, as their views on the use of AI and AI-supported tools in real classroom settings were not based on direct practical experience. Nevertheless, these views remain important because they reveal teacher candidates' awareness, tendencies, and training needs regarding such technologies.

The findings also indicate that the effective and ethical use of AI in inclusive educational environments may depend on multidimensional strategies at the implementation level. Therefore, it may be necessary to integrate AI literacy more systematically into teacher education programmes and to review existing curricula accordingly. In addition to technical knowledge, addressing issues such as educational use, ethical awareness, and critical decision-making may be beneficial. Furthermore, improving infrastructure and establishing minimum technological standards for educational institutions may contribute to reducing inequalities in access to AI-related tools and to supporting more equitable educational opportunities.

Another finding of the study highlights the importance of developing primary school teacher candidates' awareness of digital ethics and privacy, particularly regarding the accuracy of AI-generated content, data security, and potential psychosocial impacts. Involving parents and other stakeholders in this process may also contribute to a more collaborative and informed educational environment. In addition, initiatives aimed at raising public awareness of the role of AI in education may be beneficial. Ultimately, the development of a national monitoring and evaluation framework for the use of AI applications in inclusive education may help identify emerging needs and support the development of policies informed by research findings. This holistic approach may contribute to a more inclusive, equitable, and effective integration of technology into educational settings.

Research and Publication Ethics

This study fully complies with all the ethical principles outlined in the Directive for Scientific Research and Publication Ethics of the Council of Higher Education

(YÖK). None of the violations defined under the section titled "Acts Contrary to Scientific Research and Publication Ethics" in the directive were committed during the course of this research.

Ethical Approval

Ethical approval for this study was obtained from the Ethics Committee of Social and Human Sciences at Recep Tayyip Erdoğan University (Date: 24/04/2025, Decision No: 2025/176).

Author Contributions

Both authors contributed equally to the design, data collection, analysis, and writing of this study. The contribution rate is as follows: First author – 50%, Second author – 50%.

Conflict of Interest

The authors declare that there is no conflict of interest with any institution or individual in the context of this study.

Funding and Acknowledgements

This study was supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) within the scope of the 2209-A – Research Project Support Programme for Undergraduate Students (Project No: 1919B012428349).

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Genişletilmiş Özet

Bu çalışma, sınıf öğretmeni adaylarının yapay zeka (YZ) teknolojilerinin kaynaştırma eğitimi bağlamında kullanımına yönelik görüşlerini ortaya koymayı amaçlamaktadır. Alanyazında, YZ uygulamalarının kullanımına ilişkin araştırmalar bulunsa da kaynaştırma eğitimine ilişkin sınıf öğretmeni adaylarının görüşleri ile ilgili bir boşluk bulunmaktadır. Bu bağlamda çalışma, sınıf öğretmeni adaylarının görüşlerini nitel araştırma deseni temelinde derinlemesine incelemeyi hedeflemektedir. Bu temel amaç doğrultusunda araştırmanın alt amaçları şu şekilde belirlenmiştir;

1. Sınıf öğretmeni adaylarının YZ'nin kaynaştırma öğrencilerine sağladığı avantaj ve dezavantajlarına,
2. Sınıf öğretmeni adaylarının kaynaştırma öğrencileri için kullanılan mevcut YZ araçları ve uygulamalarına,
3. Sınıf öğretmeni adaylarının YZ araçlarının kaynaştırma eğitiminde kullanılmasına yönelik endişe ve çekincelerine,

4. Sınıf öğretmeni adaylarının kaynaştırma öğrencilerine yönelik YZ uygulamalarının kullanımı konusunda ihtiyaç duydukları destek ve eğitime,
5. Sınıf öğretmeni adaylarını YZ'nın kaynaştırma öğrencilerinin öğrenme süreçlerine olan katkısına,
6. Sınıf öğretmeni adaylarının kaynaştırma eğitiminde YZ'nın daha etkili kullanılabilmesi için gerekli özellikler ve geliştirme alanlarına,

ilişkin görüşlerinin belirlenmesidir.

Araştırmada nitel araştırma yaklaşımı benimsenmiş, veriler yarı yapılandırılmış görüşmeler aracılığıyla toplanmıştır. Çalışmaya, Türkiye'de bir devlet üniversitesinin sınıf öğretmenliği bölümünde öğrenim gören 15 öğretmen adayı katılmıştır. Katılımcılar, amaçlı örnekleme yöntemiyle belirlenmiştir. Görüşmeler 22 ile 32 dakika arasında sürmüş, ortalama görüşme süresi 26 dakika olarak gerçekleşmiştir. Tüm görüşmeler etik ilkeler doğrultusunda, katılımcı onayı alınarak ses kaydına alınmıştır. Araştırmada, tümevarımsal bir yaklaşım benimsenerek verilerden yola çıkılarak temalar geliştirilmiştir. Bu doğrultuda, analiz süreci altı aşamada yürütülmüştür: verilerin aşinalığı, ilk kodların oluşturulması, temaların belirlenmesi, temaların gözden geçirilmesi, temaların adlandırılması ve raporlanması. Kodlamalar sırasında yaşanan görüş ayrılığı, nitel araştırmalar konusunda uzman bir üçüncü kişinin katkısıyla giderilmiş; sonrasında tema ve alt temalar yeniden gözden geçirilerek nihai haline ulaştırılmıştır. Tüm veri yönetimi ve analiz süreçleri, veri kaybını en aza indirmek ve analiz kalitesini artırmak amacıyla MAXQDA 24 yazılımı ile gerçekleştirilmiştir.

Araştırmanın bulguları altı ana temada toplanmıştır: (1) Bireyselleştirilmiş öğrenme ve motivasyon, (2) Sınırlılıklar ve riskler, (3) Öğretimde dijital uygulama desteği, (4) Etik, bağımlılık ve veri güvenliği riskleri, (5) YZ konusunda eğitim ve farkındalık ihtiyacı, (6) Kapsayıcı ve etkileşimli öğrenme ortamları. Her tema, doğrudan katılımcı alıntılarıyla desteklenmiş ve alt temalar tablo biçiminde sunulmuştur.

Katılımcılar YZ'nın bireyselleştirilmiş eğitim içerikleri sunması, anında geri bildirim sağlaması, görsel ve işitsel uyaranlar aracılığıyla dikkat çekmek ve motive edici öğretim araçları oluşturması gibi avantajları vurgulamıştır. Erişim soruları ve bilgi güvenirliği temasında katılımcılar veri güvenliği ve gizlilik endişeleri, uygunsuz içerik ve yönlendirme riski, mekansal ve teknolojik erişim eşitsizliği ve YZ'nın empati eksikliğine ilişkin kaygılarını dile getirmişlerdir. Öğretimde dijital uygulama desteği temasını oluşturan alt temalar ise özel gereksinimlere göre uyarlanmış uygulamalar, YZ destekli ders planlama, Web 2.0 tabanlı yaratıcı öğrenme araçları ve dijital hikaye anlatımı ve kişiselleştirme olmuştur. Etik, bağımlılık ve veri güvenliği riskleri araştırmanın dördüncü temasını oluşturmaktadır. Kişisel veri güvenliği, ekran ve teknoloji bağımlığı ve sosyal izolasyon, yüzeysel öğrenme ve bilgi kirliliği alt temaları bu tema altında gruplandırılmışlardır. YZ konusunda eğitim ve farkındalık

ihtiyacı teması altında gruplandırılan alt temalar ise üniversite düzeyinde YZ eğitimi, uygulamalı kurslar ve öğretmen eğitimi ve ebeveynler için farkındalık ve bilgilendirme şeklindedir. Altıncı ve son tema olan kapsayıcı ve etkileşimli öğrenme ortamları ise şu alt temalardan oluşmuştur: etkileşimli ve ilgi çekici içerikler, farklı özel ihtiyaç türlerine uyarlanabilirlik, sosyal ve duygusal gelişim için destek.

Katılımcılar, YZ'nın bireyselleştirilmiş eğitim, öğretim desteği, geri bildirim ve öğrenci motivasyonu gibi bir dizi alanda önemli katkılar sağlayabileceği görüşünü dile getirmiştir. Ancak, veri güvenliği, erişim eşitsizliği, etik riskler ve öğretmenlerin yetkinlikleri gibi konularda da bazı endişelere sahip olduklarını ortaya koymaktadır. Araştırma bulguları, YZ uygulamalarının kaynaştırma eğitimi ortamlarını zenginleştirme potansiyelini taşıdığını göstermektedir; ancak bu entegrasyonun etkili, güvenli ve adil olmasını sağlamak için öğretmen eğitimi, dijital okuryazarlık girişimleri ve sosyal farkındalıklara duyulan ihtiyacı da vurgulamaktadır.

YZ'nın eğitimine entegrasyonu, teknik araçların kullanımının ötesine geçen ve pedagojik, etik ve sosyal boyutları da kapsayan bütüncül bir yaklaşım gerektirir. Bu bağlamda, öğretmen adaylarının bilgi, tutum ve becerilerini güçlendirmeyi amaçlayan kapsamlı eğitim programlarının geliştirilmesi, gelecekteki kapsayıcı eğitim uygulamalarının başarısı için kritik öneme sahiptir.

YZ teknolojilerinin kaynaştırma eğitimi ortamlarında etkili ve etik bir şekilde kullanılabilmesi için, hem uygulama hem de politika düzeyinde çok boyutlu stratejiler gereklidir. YZ okuryazarlığını artıracak ders içeriğinin hizmet öncesi öğretmen eğitim programlarına sistematik olarak entegre edilmesine ihtiyaç duyulmaktadır. Bu içeriğin, öğretmen adaylarına bu becerileri eleştirel ve bilinçli bir şekilde kullanma kapasitesi kazandırmak için, sadece teknik bilginin ötesine geçerek pedagojik uygulamaları ve etik ilkeleri de içermesi önemlidir. Ayrıca, YZ araçlarına erişimde bölgesel ve sosyoekonomik eşitsizliklerin giderilmesi için, dijital altyapı yatırımlarının artırılması ve eğitim kurumlarında asgari teknoloji standartlarının belirlenmesi katılımcı sınıf öğretmeni adayları tarafından vurgulanmıştır. Bu önlemler, eşitlik ilkesine dayalı bir eğitim ortamının oluşturulmasına yardımcı olacağı düşünülmektedir.

Sınıf öğretmenlerinin yanı sıra ebeveynlere de YZ destekli içeriğin doğruluğu, veri güvenliği gibi konularda farkındalık artırmak amacıyla, dijital etik ve gizlilik konusunda eğitim verilmesine ihtiyaç duyulmaktadır. Ebeveynlerin eğitimcilerle birlikte bu sürece dahil edilmesi, öğrenme ortamlarında daha işbirlikçi ve bilinçli bir yaklaşımın temelini oluşturabilecektir. Bu bağlamda, eğitimde YZ'nin rolü hakkında toplumsal farkındalığı artırmak için eğitim ve etkinlikler düzenlenmesi önerilmektedir. Sonuç olarak, YZ uygulamalarının kaynaştırma eğitimine etkisinin izlenmesi ve değerlendirilmesi için ulusal bir sistemin kurulması, öğretmenlerin ihtiyaçlarının belirlenmesi ve verilere dayalı eğitim politikalarının şekillendirilmesini kolaylaştıracaktır. Bu bütüncül yaklaşım, teknolojinin eğitim ortamlarına kapsayıcı, adil ve etkili bir şekilde entegre edilmesini kolaylaştırabilir.