INTERNATIONAL JOURNAL OF CURRENT EDUCATIONAL STUDIES

ISSN: 2822-4914

IJCES

Volume 4
Number 2
2025

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IJCES International Journal of Current Educational Studies

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International Journal of Current Educational Studies

2025, Vol. 4, No. 2, 1-29 ISSN 2822-4914

What Drives Teachers' Use of AI in Preschool Education? A Motivational Perspective Based on Expectancy-Value Theory

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Article Info

Article Type

Original Research

Article History

Received:
21 October 2025
Accepted:
18 December 2025
Published online:
20 December 2025

Abstract

Although the use of artificial intelligence in early childhood education is becoming increasingly important, theoretical studies explaining preschool teachers' motivation for using AI remain limited. Research based on the Expectancy-Value Theory, examining teachers' perceptions of competence, value, and cost holistically, is particularly scarce. This study examines preschool teachers' motivation to utilize AI tools through the lens of Expectancy-Value Theory, investigating how perceptions differ across demographic and usage-related factors. A mixed-methods explanatory sequential design was employed. Data were collected from 164 teachers using the QAIUM scale, and semi-structured interviews were conducted with 19 teachers representing different motivation levels. Teachers reported high expectancy and value perceptions but moderate cost perceptions regarding AI use. Higher professional experience, postgraduate education, and regular use of AI for instructional planning were associated with higher motivation and lower perceived costs. Qualitative findings revealed that teachers viewed AI as enriching instruction and enhancing professional efficiency while expressing concerns about data security, screen dependency, reduced creativity, and increased time demands. AI experience enhances teachers' self-efficacy and value perceptions while decreasing perceived cost. Findings underscore the significance of professional development for the effective implementation of AI in early childhood education.

Keywords: Artificial intelligence, Expectancy–Value Theory, Motivation, Preschool teacher.

Citation:

Bozer Özsaraç, E. N. & Ergin, E. (2025). What drives teachers' use of AI in preschool education? A motivational perspective based on Expectancy-Value Theory. *International Journal of Current Education Studies (IJCES)*, *4*(2), 1-29. https://doi.org/10.46328/ijces.191

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Introduction

Today, the rapid proliferation of digital tools has led to significant transformations in education and many other sectors. This development has sparked various debates about the role of digital tools in education, particularly as numerous studies have demonstrated their contribution to learning processes in early childhood (Hatzigianni et al., 2023; Mukherjee et al., 2024; Undheim, 2022). Indeed, the use of technology-compatible tools in education allows learning environments to be tailored to children's interests, enabling them to participate more actively in the learning process and become more independent in their experiences (Martzoukou, 2022).

Children are increasingly encountering the internet and artificial intelligence-based tools as technology advances rapidly. In our era, children can experience machine learning (ML) and deep learning-based search engines for themselves at a young age (Duarte Torres & Weber, 2011). Therefore, an important effect of digital tools in early childhood is the development of critical thinking skills in children (Behnamnia et al., 2020). In relation to episodic memory, children also believe that the information they access through their internet searches is the result of information collected by a group of people, rather than originating from an algorithm (Kodama et al., 2017). This indicates that their ability to approach information critically in digital environments is not yet fully developed. Therefore, for children to cope with the adverse effects that such misconceptions can cause, they must develop higher-level cognitive skills such as critical thinking and evaluation (Sanders et al., 2020).

The use of AI-supported preschool education programs increases children's academic competence while also contributing to their development in terms of problem-solving skills. This, in turn, increases children's performance-based motivation while also contributing to the development of their emotional regulation skills (Zhao et al., 2025). In this context, due to the needs of our age and the indispensability of technology in our lives, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) has determined a competence framework for teachers and students regarding the integration of artificial intelligence into education. The framework for students aims to increase individual independence and productivity with a human-centered mindset, raise awareness about conscious AI use and ethical use with AI ethics, develop individuals' basic knowledge and skills with AI techniques, and strengthen problem-solving, creative thinking, and design-oriented skills with AI system design (UNESCO, 2024a). For teachers, it emphasizes that artificial intelligence tools should be viewed as complementary elements that enhance teachers' fundamental roles and responsibilities, rather than supplanting them. It provides a comprehensive guide aimed at supporting teachers' professional development processes through the ethical and responsible use of artificial intelligence, while also minimizing potential societal risks for students (UNESCO, 2024b). In light of this information, artificial intelligence is considered important today as part of Education 2030, which aims to develop inclusive, quality, and lifelong learning experiences for educators, families, policymakers, and children or students. In this context, the emergence of generative AI, although not yet developed for educational purposes, has raised various ethical, legal, and social debates. Within the framework of the OECD Teaching Compass for 2030, three key areas have been identified for teachers regarding the use of artificial intelligence in education to support teachers' skills and competencies while also recognizing that they themselves are lifelong learners. These are: teacher autonomy, well-being, and competence (OECD, n.d.). Teacher autonomy enables teachers to adapt the curriculum and pedagogical strategies to the

individual needs of children, thereby creating a more responsive and inclusive learning environment. However, structural constraints, such as standardized curricula, pressures related to accountability, and limited professional development opportunities, can limit teachers' ability to utilize this autonomy effectively (OECD, 2024). In this context, teacher autonomy facilitates the coexistence of teachers and artificial intelligence in the classroom. Thus, teachers gain direct experience on how artificial intelligence can be used in education and can integrate these technologies more consciously into pedagogical purposes (Mouta et al., 2025; Tripathi et al., 2025).

In Turkey, the importance of integrating artificial intelligence into education is emphasized in the "2025-2029 Artificial Intelligence in Education Policy Document and Action Plan," a report prepared in June 2025. According to the report, artificial intelligence enhances the professional performance of teachers, and its systematic use in education, aligned with pedagogical goals, plays a significant role in improving the quality of education. In this context, it is planned to encourage the design of training programs aimed at enhancing digital skills for teachers in collaboration with the National Education Academy Presidency, and to promote the development of educational policies that will implement practical support mechanisms for integrating artificial intelligence technologies into the teaching process (Ministry of Education, 2025a).

In addition, the potential psychological effects that artificial intelligence may have on teachers, as well as how it can be designed and implemented to support teachers' well-being, are also considered important (Chua & Bong, 2024). Indeed, research has shown that emotional intelligence and psychological well-being skills impact teacher competence in utilizing artificial intelligence in teaching applications (Asad et al., 2023; Duan & Zhao, 2024). This is because these skills support teachers in understanding, managing, and empathizing with both their own emotions and those of others (Lin & Chen, 2024), while also playing an important role in teachers creating a favorable classroom climate and communicating effectively with children (Wang & Kruk, 2024; Zhi & Wang, 2024). In light of this information, maintaining a school culture that preserves teacher autonomy, integrating artificial intelligence into classrooms within the framework of ethical principles, and providing teachers with training support on artificial intelligence literacy are seen as practical elements in the healthy implementation of this process (Bleikher et al., 2025; Eyal, 2025). However, artificial intelligence should be considered as part of teaching practices that enhance teachers' expertise and support their well-being, rather than replacing them (OECD, 2025).

In the third area, teacher competencies outline the level of knowledge and skills that teachers should possess regarding the use of artificial intelligence in education and the risks that may arise from this process (OECD, n.d.). Regarding teacher competencies, Zhao et al. (2021) emphasize that the cultural context of the region where the practice takes place is crucial for teachers' professional development. For this purpose, training programs designed to support teachers' professional development should be developed in line with the needs of these regions. Therefore, determining learning outcomes in terms of artificial intelligence in a manner appropriate for the professional development of teachers working at different levels of education has become necessary in teacher training programs in this context (Al-Zyoud, 2020; Touretzky et al., 2019; Vlasova et al., 2019). However, a study emphasizes that teacher training programs should be designed to strengthen teachers' basic AI skills, inform them about appropriate AI content they can use in the classroom, combine interactive and collaborative teaching

methods, provide guidance on accessible software and hardware options, and support teachers' motivation to use AI. (Vlasova et al., 2019). Furthermore, studies examining teachers' perspectives on the use of artificial intelligence in educational settings have concluded that teachers are willing to incorporate artificial intelligence into their classrooms and adopt a supportive attitude toward their students during the learning process (Alexandre et al., 2021). In contrast, another study concluded that teachers have limited competence in digital skills and the use of artificial intelligence in educational settings (Chounta et al., 2022).

Based on current knowledge, teachers' autonomy, well-being, and competence levels significantly influence the integration of AI into education. Within this framework, this study aims to examine preschool teachers' motivations for using artificial intelligence tools within the framework of the Expectancy-Value Theory. The Expectancy-Value Theory, which is the focus of this study, explains the effect of motivation on individuals' behaviors and choices (Eccles & Wigfield, 2002). The Expectancy-Value Theory consists of self-efficacy beliefs, performance expectancy, and value structures (Wigfield & Eccles, 2000). According to the theory, individuals' expectations of success and the value they place on success are seen as important determinants of their motivation to perform tasks (Wigfield, 1994). Expectancy-value theory focuses on two fundamental cognitive influences: individuals' judgments regarding the likelihood of success in a task (expectancies) and their reasons for participating in the task (values). In this model, individuals consider both the value and the likelihood of success when choosing between different options. Furthermore, an individual's expectations of success are significantly influenced by their perceived competence (Bümen & Uslu, 2020). Therefore, this research is considered important in terms of revealing teachers' perceptions of their competence regarding artificial intelligence technologies, which has been an important topic in the literature recently, their perceptions of the value of these technologies, and their evaluations of the difficulties they encounter in the use process.

Theoretical Framework

This study examines the factors that determine preschool teachers' use of artificial intelligence, drawing on expectation-value theory. In this context, this section explains the theoretical basis of the study. An effective learning-teaching process depends on the success of two components. The first is ensuring learner motivation, and the second is the learner's participation in the learning process in cognitive, behavioral, and emotional dimensions (Sarıtepeci, 2018). Cognitive participation involves the individual carrying out an active, conscious, and purposeful thinking process; behavioral participation involves the individual making an effort by exhibiting positive behaviors related to learning; emotional participation involves showing interest in the learning process, establishing identification, meeting the need to belong, and developing a positive attitude towards learning (Eryılmaz, 2013; Newmann et al., 1992). At this point, one of the theories explaining individuals' behaviors related to their success in participation processes is the expectancy-value theory. The theory suggests that an individual's success depends on their effort toward learning and their expectation of reward in return for success (Slavin, 2013; Wigfield & Eccles, 2002). In contrast, expectancy-value theory attributes two premises to the underlying motivation for individuals to succeed in a task or situation: personal expectations (beliefs about being successful) and perceptions of value (the importance or meaningfulness of the task) (Atkinson, 1964; Wigfield & Eccles, 2000).

The relationship between expectation and value was first proposed by Atkinson (1964) and is accepted as a theory explaining individuals' motivation for success. The theory is based on individuals' expectations (their belief that they can achieve success) and the importance they attach to the goal (the value they place on achieving this success). In subsequent years, Atkinson's approach was developed to form the modern expectancy-value theory. The modern expectancy-value theory presents a more comprehensive model for explaining achievement motivation by combining concepts found in different motivation theories (Eccles, 1983; Wigfield et al., 2015). According to the model, the effort an individual exerts to achieve a goal and their level of self-efficacy during this process directly influence their expectation of achieving the goal (Wigfield & Eccles, 1992). Individuals' beliefs about their level of competence to achieve a goal are explained in the literature by concepts such as self-confidence and self-efficacy (Wigfield & Eccles, 2000). In expectancy-value theory, the concept of value is addressed in four dimensions (Wigfield & Eccles, 2000). These are: value, utility, interest, and cost. In this context, importance refers to the individual's assessment of the goal's significance; utility refers to the extent to which the goal aligns with long-term objectives. Interest explains the individual's interest in the goal in the context of self-determination theory in relation to the concepts of intrinsic and extrinsic motivation (Deci & Ryan, 1985), while cost explains the sacrifices made by the individual to achieve the goal (Eccles & Wigfield, 2024; Wigfield, 1994; Wigfield & Cambria, 2010). In conclusion, expectancy-value theory provides a crucial theoretical framework for understanding preschool teachers' motivations and perceptions of value regarding the use of AI, and it forms the basis for interpreting the study's findings. In this context, the research questions are listed below:

Quantitative research questions:

1. What is the level of preschool teachers' expectancy for using artificial intelligence tools?
2. What are the perceived value levels of preschool teachers' use of artificial intelligence tools (attainment, utility, interest, and cost)?
3. Do teachers' motivations for using artificial intelligence tools vary based on demographic variables?

Qualitative research questions:

1. What are preschool teachers' perceptions of their ability to use artificial intelligence tools effectively in the classroom?
2. What value do preschool teachers perceive the use of artificial intelligence tools to have in terms of their professional practice? (attainment, utility, interest, cost)

Method

Research Model

The research was planned according to the explanatory sequential design, a type of mixed methods design. The explanatory sequential design is a mixed-methods design in which quantitative data are first collected and analyzed to address the research problem, followed by the application of a qualitative phase to provide in-depth interpretation and explanation of the quantitative results obtained (Creswell, 2021). In the quantitative dimension of the research, the "Questionnaire of Artificial Intelligence Use Motives" developed by Yurt and Kaşarcı (2024) was employed to assess the motivation of pre-school teachers to utilize artificial intelligence. In the qualitative dimension, a semi-structured interview form developed by the researchers was used. Semi-structured interviews are a flexible interview technique in which questions are prepared in advance. However, the process is not entirely

rigid, allowing the researcher to rearrange questions and add probing questions when necessary, aiming to gather in-depth information through open-ended questions (Büyüköztürk et al., 2012; Sönmez & Alacapınar, 2014).

Sample

Convenience sampling was employed to select the participants for the study. In convenience sampling, the researcher creates a sample group from individuals who are accessible and willing to participate in the study. This technique is a sampling method that saves the researcher time, cost, and labor, thereby enabling the data collection process to be carried out more efficiently (Büyüköztürk et al., 2012). A total of 164 teachers from Turkey participated in the quantitative dimension of the study. Information about the participants is presented in Table 1.

Table 1. Distribution of Teachers According to Demographic Characteristics

		f	%
Gender	Female	153	93,3
	Male	11	6,7
Age	22-30 years old	61	37.2
	31-40 years old	64	39.0
	41 years old and above	39	23.8
Professional experience	1-5 years	51	31.3
	6-10 years	44	27.0
	11 years and more	68	41.7
Educational status	Bachelor's degree	123	75.0
	Master's degree	40	24.4
	Doctoral degree	1	0.6
Usage of artificial intelligence tools in the educational planning process	Yes, I use them regularly	33	20.1
	Yes, I use them occasionally	106	64.6
	No, I have never used them	25	15.2
Usage of artificial intelligence tools during lessons	Yes, I use them regularly	16	9.8
	Yes, I use them occasionally	81	49.4
	No, I have never used them	67	40.9

93.3% of participants (153 individuals) were female, while 6.7% (11 individuals) were male. Participants' ages were distributed across the following ranges: 22–30 years old (37.2%), 31–40 years old (39.0%), and 41 years old and above (23.8%). It was observed that 31.3% of participating teachers had 1 to 5 years of professional experience, 27% had 6 to 10 years, and 41.7% had 11 years or more. The vast majority of participating teachers (75%) held a bachelor's degree, with only one teacher (0.6%) holding a doctoral degree. A significant proportion of teachers (64.6%) stated that they used artificial intelligence tools in the educational planning process. When examining teachers' use of artificial intelligence during lessons, 9.8% (n=16) stated that they used artificial intelligence applications regularly, 49.4% (n=81) stated that they used them occasionally, and 40.9% (n=7) stated that they never used them.

Finally, within the demographic information, details were also gathered regarding the technological tools that participants frequently use and employ as educational materials. The most frequently used technological tool among participants was the smartphone (n=158). This was followed by the computer (n=121), tablet (n=26), television (n=8), smart board (n=7), and projector (n=2). The most commonly used tool for educational material was the computer (n = 122). This is followed by smartboards (n = 83), smartphones (n = 21), projectors (n = 19), tablets (n = 7), and televisions (n = 6). Based on these results, it can be concluded that there is a clear distinction

between personal use and educational use in teachers' interactions with technology.

In the qualitative dimension of the research, participants were selected from among the teachers participating in the quantitative application using purposive sampling. This selection aimed to reach teachers with varying levels of motivation scores. Thus, the aim was to include participants who could provide a deeper understanding of the expectation-value structure regarding the use of artificial intelligence. The interviews were conducted until data saturation was achieved, and the process was completed with a total of 19 teachers, comprising one male and 18 females. Participants were coded as K1, K2, K3 and so on, in accordance with the principle of confidentiality.

Data Collection Tools

In the quantitative dimension of the research, the "Demographic Information Form" and the "Questionnaire of Artificial Intelligence Use Motives (QAIUM)" were used. In the qualitative dimension, a semi-structured interview form developed by the researchers was used.

Demographic Information Form

Developed by the researchers to collect information about participants' age, gender, professional experience, frequently used technological tools, technological tools used as educational materials, and their use of artificial intelligence tools in planning education and during lessons.

Artificial Intelligence Usage Motivation Questionnaire (QAIUM)

Developed by Yurt and Kaşarcı (2024), this scale comprises 20 items and was designed based on the Expectancy-Value theory to measure individuals' motivation to use artificial intelligence applications. The scale comprises five dimensions: Expectancy, Attainment, Utility, Intrinsic/Interest Value, and Cost, and all items are answered using a 5-point Likert-type scale (1 = Completely False, 5 = Completely True). Items in the Cost dimension are reverse-scored. The average scores obtained from the scale are interpreted on a scale of 1 to 5, with motivation levels classified as very low (1.00–1.80), low (1.81–2.60), moderately high (2.61–3.40), high (3.41–4.20), and very high (4.21–5.00). High averages for the Cost dimension indicate a higher perception of time/effort cost.

Validity studies were conducted using Exploratory and Confirmatory Factor Analysis, and internal consistency coefficients were reported to be in the range of .865–.935 (Yurt & Kasarci, 2024). These findings indicate that the scale is reliable and structurally valid. For this study, the reliability analysis of the scale was repeated, and the Cronbach's Alpha value calculated for the scale was .848. Meanwhile, the Cronbach's Alpha values for the sub-dimensions ranged from .787 to .935.

Semi-structured Interview Form

The researchers developed this form to examine in depth the motivations of participating teachers regarding the

use of artificial intelligence. Developed based on the Expectancy-Value Theory, the form consists of 13 items. To determine the content validity of the form, it was sent to three experts: a preschool teacher, an assessment and evaluation specialist, and a specialist in preschool education. They were asked to evaluate the items in terms of clarity and appropriateness. Each item was scored from 1 to 5 in terms of clarity and appropriateness (1 = Very poor, 5 = Very good). The analysis revealed that the average clarity score was 4.85 and the average appropriateness score was 4.82. Since most items were rated close to 5 points, it was observed that the statements were linguistically clear and content-wise appropriate for the purpose. Accordingly, only minor linguistic corrections were made, and no significant changes were required in terms of content.

Data Collection Process

The research data were collected using online data collection forms administered via Google Forms. The survey link was initially shared with administrators of preschool institutions, who distributed it to preschool teachers working in their institutions. In addition, the link was forwarded to other preschool teachers through professional networks, and the researchers also directly shared the survey link with preschool teachers known to them.

A total of 172 responses were collected through this process. After data screening, duplicate responses and responses from participants without professional teaching experience were excluded. Accordingly, the final dataset consisted of 164 preschool teachers, and all analyses were conducted based on this sample. The necessary ethical permission for the research was obtained from the Selçuk University Faculty of Education Ethics Committee with its letter dated 22.09.2025 and numbered 1087851.

Data Analysis

The motivation scores for artificial intelligence use were first subjected to a normality test, and the skewness and kurtosis coefficients were examined. For the assumption of normal distribution to be met, it is sufficient for the skewness and kurtosis coefficients to be within the ±1 range (Tabachnick & Fidell, 2007). In this study, the calculated skewness and kurtosis coefficients were found to be within the specified range (Table 2).

Table 2. Descriptive Values of Scores Obtained from the Artificial Intelligence Usage Motivation Scale

Variables	M	SD	Skewness		Kurtosis	
			Statistic	SD	Statistic	SD
Expectancy	3.47	0.782	-0.10	0.190	-0.142	0.377
Attainment	3.64	0.953	-0.690	0.190	0.239	0.377
Utility value	3.89	0.834	-0.747	0.190	0.544	0.377
Intrinsic/ interest value	3.79	0.947	-0.870	0.190	0.725	0.377
Cost	2.63	0.770	0.460	0.190	0.417	0.377
Task Value Total	3.49	0.497	-0.855	0.190	0.521	0.377

The descriptive statistics for the scale's subscales were examined in the study. Furthermore, an independent sample t-test was used to compare participants' motivation scores regarding artificial intelligence usage according to gender and educational status. A one-way analysis of variance was performed to compare scores according to the variables of age, professional experience, use of artificial intelligence tools during lesson planning, and use of

artificial intelligence tools during lessons. The data were analysed using the free and open-source statistical software Jamovi 2.7.12.

In this study, qualitative data were analysed using a theoretical thematic analysis approach within the Expectancy-Value Theory framework. Theoretical thematic analysis is defined as an approach guided by a specific theoretical area of interest and providing an explicitly analyst-oriented analysis (Braun & Clarke, 2006). This deductive method aims to examine a specific dimension in depth rather than providing a broad description of the data as a whole (Braun & Clarke, 2006).

Results

Quantitative Findings

This section presents the findings related to the quantitative data of the study. Firstly, teachers' perceived levels of expectancy in using artificial intelligence tools were examined using descriptive statistics. Descriptive statistics regarding teachers' expectancy scores are presented in Table 3.

Table 3. Descriptive Statistics Regarding Preschool Teachers' Expectancy Scores in Using Artificial Intelligence Tools

Variable	N	M	SD
Expectancy	164	3.47	0.78

Table 3 shows that the average score for teachers' expectancy in using artificial intelligence tools is 3.47 (SD=0.78). Considering that the scale is scored on a 1-5 range and that the 3.41-4.20 range is considered "high level" (Yurt and Kaşarcı, 2024), it can be said that teachers' expectancy in using artificial intelligence tools is at a high level. Teachers' perceptions of the value of using artificial intelligence were examined, and descriptive statistics regarding the sub-dimensions: attainment, utility value, intrinsic/ interest value, cost, and the superordinate dimension: value scores are presented in Table 4.

Table 4. Descriptive Statistics Regarding Preschool Teachers' Perceptions of Task Value in the Use of Artificial Intelligence Tools

Variables	N	M	SD
Attainment	164	3.64	0.95
Utility value	164	3.89	0.83
Intrinsic/ interest value	164	3.79	0.94
Cost	164	2.63	0.77
Task Value Total	164	3.49	0.49

Table 4 shows that the attainment (M=3.64), utility (M=3.89) and intrinsic value (M=3.79) dimensions fall within the range of 3.41-4.20. This range is considered "high level" according to the scale. Accordingly, it can be said that teachers find the use of artificial intelligence important and functional and enjoy the process. The average of the cost dimension being 2.63 indicates that the perception of cost is at a moderately-high level. According to the scale guidelines, low scores in this dimension (after reverse scoring) indicate that teachers perceive the process of

learning and using artificial intelligence applications as more costly in terms of time, effort, and cognitive load (Yurt & Kaşarcı, 2024). This finding indicates that although teachers acknowledge the benefits of artificial intelligence, they believe that managing the application process requires a certain level of effort.

Table 5. Examination of Preschool Teachers' Motivation to Use Artificial Intelligence Tools According to Gender

Variables	Gender	N	M	SD	t (162)	p
Expectancy	Female	153	3.42	0.782	-2.684	0.008*
	Male	11	4.07	0.501		
Attainment	Female	153	3.62	0.966	-0.958	0.340
	Male	11	3.91	0.727		
Utility value	Female	153	3.88	0.846	-0.812	0.418
	Male	11	4.09	0.645		
Intrinsic/ interest value	Female	153	3.76	0.955	-1.517	0.131
	Male	11	4.20	0.740		
Cost	Female	153	2.65	0.775	1.592	0.113
	Male	11	2.27	0.617		

*p<0,05

According to the results of the independent sample t-test conducted by gender (Table 5), a significant difference was found only in the expectancy dimension (t(162) = -2.68, p = .008). Male teachers' perception of expectancy (M=4.07) is higher than that of female teachers (M=3.42). However, no significant difference was found between genders in the attainment (t(162)=-0.96, p=.340), utility value (t(162)=-0.81, p=.418) and intrinsic/ interest value (t(162)=-1.52, p=.131) dimensions. There is also no significant difference between the groups in the cost dimension (t(162) = 1.59, p=.113).

Table 6. Examination of Preschool Teachers' Motivation to Use Artificial Intelligence Tools According to Age Level

Variables	Age	N	M	SD	F	p
Expectancy	22–25	61	3.36	0.73	2.60	.080
	26–30	64	3.64	0.73		
	31+	39	3.35	0.91		
Attainment	22–25	61	3.55	0.80	0.93	.398
	26–30	64	3.76	0.97		
	31+	39	3.60	1.12		
Utility value	22–25	61	3.82	0.79	2.37	.099
	26–30	64	4.07	0.82		
	31+	39	3.72	0.87		
Intrinsic/ interest value	22–25	61	3.73	0.84	2.46	.091
	26–30	64	3.98	0.88		
	31+	39	3.56	1.14		
Cost	22–25	61	2.74	0.67	1.27	.285
	26–30	64	2.53	0.77		
	31+	39	2.62	0.88		

The results of the one-way ANOVA conducted according to the age variable (Table 6) showed that there was no significant difference in the motivation dimensions of teachers towards the use of artificial intelligence (p > .05). As seen in Table 6, it is noteworthy that the 26–30 age group had higher scores for expectancy (M=3.64), attainment (M=3.76), utility value (M=4.07), and intrinsic/ interest value (M=3.98) than the other groups.

However, these differences are not statistically significant ($F_{expectancy}$=2.60, p=.080; $F_{attainment}$=0.93, p=.398; $F_{utility}$=2.37, p=.099; $F_{intrinsic}$=2.46, p=.091; F_{cost}=1.27, p=.285). The fact that the means are quite close to each other in terms of cost (M=2.53-2.74) indicates that age groups evaluate the use of artificial intelligence similarly in terms of time and effort. These findings reveal that teachers' motivation towards artificial intelligence does not differ significantly according to the age variable.

Table 7. Examination of Preschool Teachers' Motivation to Use Artificial Intelligence Tools According to Their Professional Experience

Variables	Professional experience	N	M	SD	F	p
Expectancy	1-5 years	51	3.36	0.70	3.87	.024*
	6-10 years	44	3.74	0.74		
	11 years and more	68	3.39	0.84		
Attainment	1-5 years	51	3.56	0.87	0.88	.418
	6-10 years	44	3.78	0.82		
	11 years and more	68	3.62	1.09		
Utility value	1-5 years	51	3.87	0.82	0.27	.765
	6-10 years	44	3.97	0.81		
	11 years and more	68	3.86	0.88		
Intrinsic/ interest value	1-5 years	51	3.78	0.87	1.14	.325
	6-10 years	44	3.95	0.85		
	11 years and more	68	3.68	1.06		
Cost	1-5 years	51	2.75	0.73	1.28	.283
	6-10 years	44	2.51	0.69		
	11 years and more	68	2.61	0.85		

*p<0,05

The results of the one-way ANOVA conducted according to professional experience (Table 7) showed a significant difference only in the expectancy dimension (F(2,102)=3.87, p=.024). When examining the descriptive statistics, it is observed that teachers with 6–10 years of experience have higher expectancy scores (M=3.74) compared to other groups. In contrast, no statistically significant differences were found in the attainment, utility, intrinsic value, and cost dimensions (p>.05). This finding indicates that motivation towards artificial intelligence is generally independent of professional experience, but that the perception of expectancy may be higher within a specific experience range (6–10 years).

Table 8. Examination of Preschool Teachers' Motivation to Use Artificial Intelligence Tools According to their Graduation Status

Variables	Educational Status	N	M	SD	t (162)	p
Expectancy	Undergraduate	123	3.34	0.75	-3.86	<.001*
	Postgraduate	41	3.86	0.76		
Attainment	Undergraduate	123	3.55	1.00	-2.08	.039*
	Postgraduate	41	3.91	0.75		
Utility value	Undergraduate	123	3.82	0.86	-1.88	.062
	Postgraduate	41	4.10	0.74		
Intrinsic/ interest value	Undergraduate	123	3.67	0.98	-2.76	.007*
	Postgraduate	41	4.13	0.76		
Cost	Undergraduate	123	2.70	0.81	2.01	.046*
	Postgraduate	41	2.42	0.61		

*p<0,05

Table 8 compares teachers' motivation levels for using artificial intelligence according to their graduation status. According to the results of the independent samples t-test, postgraduate graduates' expectancy levels ($t(162) = -3.86$, $p < .001$), their perceptions of attainment ($t(162)=-2.08$, $p=.039$), and their intrinsic value levels ($t(162)=-2.76$, $p=.007$) were found to be significantly higher. The difference in the utility dimension was not significant ($p = .062$). In the cost dimension, the postgraduate group had a lower mean ($M = 2.42$), and this difference was significant ($t(162) = 2.01$, $p = .046$). Because higher scores on the cost dimension reflect greater perceived time and effort demands, the lower mean score indicates that teachers with postgraduate degrees view the use of artificial intelligence as requiring less time, effort, and cognitive load. Accordingly, these teachers appear to view the process of learning and using artificial intelligence applications as less laborious compared to teachers with undergraduate degrees.

Table 9. Comparison of Motivation Dimensions According to the Use of Artificial Intelligence Tools in the Education Planning Process

Variables	Usage of Artificial Intelligence Tools in the Education Planning Process	N	M	SD	F	p*	Games-Howell Post Hoc
Expectancy	Regular User[1] Occasional User[2] Never Used[3]	33 106 25	4.08 3.46 2.67	0.73 0.64 0.71	27.3	< .001	1>2, 1>3, 2>3
Attainment	Regular User[1] Occasional User[2] Never Used[3]	33 106 25	4.30 3.68 2.61	0.63 0.80 1.05	27.3	< .001	1>2, 1>3, 2>3
Utility value	Regular User[1] Occasional User[2] Never Used[3]	33 106 25	4.54 3.88 3.10	0.51 0.72 0.93	30.8	< .001	1>2, 1>3, 2>3
Intrinsic/ interest value	Regular User[1] Occasional User[2] Never Used[3]	33 106 25	4.44 3.79 2.92	0.50 0.90 0.92	32.5	< .001	1>2, 1>3, 2>3
Cost	Regular User[1] Occasional User[2] Never Used[3]	33 106 25	2.14 2.61 3.36	0.60 0.66 0.87	18.9	< .001	3>2, 3>1, 2>1

*All ANOVA results are significant at the $p < .001$ level.

As shown in Table 9, there were significant differences in expectancy, attainment, utility value and intrinsic/ interest value levels according to teachers' use of artificial intelligence tools in the educational planning process (F values = 18.9–32.5, $p < .001$). According to the Games-Howell multiple comparison results, the averages of those who regularly use artificial intelligence tools are significantly higher than those who use them occasionally or not at all in all motivation dimensions. Furthermore, the scores of those who use them occasionally are also significantly higher than those who do not use them at all. In terms of cost, high averages represent more time/labour costs. In this regard, it is seen that those who never use artificial intelligence have the highest cost perceptions ($M=3.36$), while regular users have the lowest ($M=2.14$). It can be said that regular use of artificial intelligence increases expectancy, attainment, utility value, and intrinsic/ interest value motivations while reducing perceived cost.

Table 10. Comparison of Motivation Dimensions According to the Use of Artificial Intelligence Tools During Lessons

Variables	Usage of artificial intelligence tools during lessons	N	M	SD	F	P*	Games-Howell Post Hoc
Expectancy	Regular User[1]	16	4.11	0.65	13.6	< .001	1>2, 1>3, 2>3
	Occasional User[2]	81	3.60	0.66			
	Never Used[3]	67	3.16	0.82			
Attainment	Regular User[1]	16	4.44	0.51	24.7	< .001	1>2, 1>3, 2>3
	Occasional User[2]	81	3.88	0.74			
	Never Used[3]	67	3.17	1.03			
Utility value	Regular User[1]	16	4.67	0.44	29.8	< .001	1>2, 1>3, 2>3
	Occasional User[2]	81	4.10	0.60			
	Never Used[3]	67	3.45	0.91			
Intrinsic/ interest value	Regular User[1]	16	4.58	0.50	26.6	< .001	1>2, 1>3, 2>3
	Occasional User[2]	81	4.05	0.71			
	Never Used[3]	67	3.29	1.02			
Cost	Regular User[1]	16	1.92	0.51	23.1	< .001	3>2, 3>1, 2>1
	Occasional User[2]	81	2.45	0.60			
	Never Used[3]	67	3.01	0.81			

*All ANOVA results are significant at the p < .001 level.

Significant differences were found in teachers' motivation levels based on their use of artificial intelligence tools during lessons (Table 10). According to the results of the one-way ANOVA, the differences between groups were statistically significant in all motivation dimensions (F = 13.6–29.8, p<.001). When examining group averages, it is seen that teachers who use AI tools regularly have higher levels of expectancy (M=4.11), attainment (M=4.44), utility (M=4.67), and intrinsic value (M=4.58) than the other two groups. The motivation levels of teachers who used it occasionally were significantly higher than those who never used it. High averages in the cost dimension indicate a higher perception of time/effort cost. Accordingly, teachers who never used it had the highest cost perceptions (M=3.01), while those who used it regularly had the lowest (M=1.92). In conclusion, regular use increases expectancy, attainment, utility value and intrinsic/ interest value, while reducing perceived cost.

Qualitative Findings

This section presents the findings related to the qualitative data of the study under the heading of research questions.

Preschool Teachers' Perceptions Regarding their Ability to Effectively Use Artificial Intelligence Tools in the Classroom Environment

In this section, teachers' expectancy regarding using artificial intelligence tools was analysed in line with Expectancy–Value Theory. As a result of coding, five sub-themes were identified under the overarching theme of "Expectancy": (1) Initial Self-Efficacy Perception, (2) Expectancy Developed through Experience, (3) Self-Efficacy Reinforced by Success Experiences, (4) Capacity to Cope with Difficulties, and (5) Contextual Expectancy. Table 11 presents the distribution of participants across the sub-themes.

Table 11. Sub-Themes Related to Preschool Teachers' Expectations Regarding Their Use of Artificial Intelligence Tools

Sub-Themes	Participants
1. Initial Self-Efficacy Perception	K1, K2, K3, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14, K16, K18, K19
2. Expectancy Developed through Experience	K4, K5, K6, K10, K11, K13
3. Self-Efficacy Reinforced by Success Experiences	K4, K5, K7, K9, K10, K11, K17, K19
4. Capacity to Cope with Difficulties	K2, K3, K6, K11, K13, K16, K18, K19
5. Contextual Expectancy	K14, K15, K17, K19

The findings of the analysis indicate that pre-school teachers' perceptions of their expectancy in using artificial intelligence are multi-layered and shaped by the process. Although the majority of participants have a certain level of expectancy at the outset, this perception varies according to personal experience and context. Some teachers stated that their expectancy increased through trial and error and repetition as they used AI tools; positive student feedback and ease in daily tasks obtained during this process significantly reinforced their self-efficacy perceptions. However, some teachers indicated that they were able to manage the process by seeking help or generating solutions when encountering technical difficulties. This finding demonstrates that expectancy is based not only on "initial capacity" but also on "sustaining ability." Furthermore, teachers assessed their technological competence contextually; they felt quite competent with some tools but were more cautious with others. Overall, teachers' expectations of competence exhibit a holistic and dynamic structure shaped by initial self-confidence, experience-based learning, motivation reinforced by success, and context-specific usage preferences. Below are some participant statements as examples within the relevant theme:

"I am confident because I am knowledgeable about the subject." (K10)
"When I first started using it, I didn't have enough confidence. However, as I used it, my confidence increased." (K13)
"Based on the feedback I receive from students; I think I use artificial intelligence successfully in the classroom environment." (K5)
"Although I sometimes encounter technical or pedagogical difficulties, I see them as learning opportunities... Trying out new tools, sharing experiences with my colleagues, and conducting small experiments help me overcome these difficulties." (K11)
"I use it especially for preparing materials. I use it effectively to prepare storybooks, topic-related activities, and game materials." (K14)

What Kind of Values do Pre-school Teachers Consider Artificial Intelligence Tools to Hold in Terms of Their Professional Practice?

Analysis aimed at understanding the values preschool teachers attribute to artificial intelligence reveals that teachers evaluate this technology not only as a pedagogical tool but also as a multidimensional structure that supports their professional roles, relates to their identity, arouses curiosity, and in some cases incurs a cost burden. The findings are organized holistically under the themes of attainment, utility value, intrinsic/ interest value, and

cost within the Expectancy-Value Theory framework. These themes clarify the reasons why teachers perceive artificial intelligence tools as meaningful, valuable, or risky.

Table 12. Sub-themes Related to the Attainment Value Preschool Teachers' Attribute to the Use of Artificial Intelligence Tools

Sub-Themes	Participants
1. Importance Attributed to Professional Development	K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K13, K14, K15, K17, K18
2. Alignment with Teaching Identity	K1, K2, K3, K4, K5, K6, K9, K10, K11, K13, K14, K15, K16, K17, K18, K19
3. Importance Attributed to Student Development	K1, K2, K3, K4, K5, K6, K9, K10, K11, K13, K14
4. Professional Functionality and Ease of Use	K3, K4, K7, K12, K17, K19

Table 12 presents the sub-themes that emerged regarding the attainment value teachers attributed to the use of artificial intelligence tools. Teachers' perceptions of attainment are evident in several dimensions. Firstly, it is common for artificial intelligence to be seen as a necessity for professional development. Participants define technology as an element that updates their teaching roles and supports professional renewal. Furthermore, the issue of AI's compatibility with the teaching identity shows diversity in opinions: while some teachers embrace the technology as a natural part of their innovative identity, others state that it only partially aligns with their values. The emphasis on student development stands out as a common point; participants state that artificial intelligence increases students' motivation to learn, enriches processes, and is effective in preparing them for the skills required by the era. Overall, the findings on the theme of attainment show that artificial intelligence has gained a meaningful place in teachers' professional positioning. Below are some participant statements as examples within the relevant theme:

"As a teacher, I believe that using artificial intelligence technologies effectively is important for my professional development." (K6)
"It overlaps quite a bit... I believe that the learning habits of the new generation need to be considered." (K5)
"The more effectively we as teachers use artificial intelligence, the more we will prepare children for the technological age, perhaps taking today's technology to a much more advanced level." (K4)
"It can prepare work for us in a very short time that could sometimes take days or weeks." (K19)

Table 13. Sub-themes Related to the Utility Value Provided by Artificial Intelligence Tools According to the Opinions of Preschool Teachers

Sub-Themes	Participants
1. Utility Supporting the Teaching Process	K1, K2, K3, K4, K5, K6, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19
2. Utility Contributing to Classroom Management	K1, K2, K3, K4, K5, K6, K7, K11, K13, K14, K15, K16, K17, K19

Table 13 presents sub-themes related to the utility provided by artificial intelligence tools according to teachers' views. The utility value theme reflects teachers' concrete observations on how artificial intelligence transforms

teaching processes. The majority of participants define artificial intelligence as a tool that makes learning more engaging, understandable, and memorable. In addition, teachers stated that AI-supported materials provide strong support in terms of visualisation and differentiating teaching. Opinions on classroom management show more diversity: while some participants find technology effective in managing attention, others see this contribution as limited. In summary, the theme of utility reveals that the educational functions of artificial intelligence are strongly accepted, but its effects on classroom management are evaluated more contextually. Below are some participant statements as examples within the relevant theme:

"I prefer to use it for concepts that would remain abstract for children. It attracts their interest more, and they don't lose focus on the subject immediately." (K2)
"I believe the greatest contribution of artificial intelligence tools to the teaching process is in personalising learning and enriching the teaching process." (K11)
"…I can say it most facilitates classroom management. It can quickly bring a distracted class back together." (K13)

Table 14. Sub-themes of Intrinsic/ Interest Value Towards Artificial Intelligence Tools According to the Opinions of Preschool Teachers

Sub-Themes	Participants
1. High Interest and Curiosity	K1, K2, K3, K4, K5, K6, K9, K10, K11, K13, K14, K15, K18, K19
2. Moderate And Conditional Interest	K6, K7, K8, K15
3. Lack Of Interest and Negative Attitude	K16, K17

Table 14 presents sub-themes related to teachers' intrinsic/interest value regarding the use of artificial intelligence tools. The theme reflects teachers' intrinsic inclinations towards using artificial intelligence tools. Most participants find exploring artificial intelligence exciting and express a willingness to develop themselves in these areas. Interest was seen to vary depending on the context for some teachers; situations where students' reactions aroused interest were noteworthy. In contrast, two participants stated that they did not find the AI interesting and did not have internal motivation. The overall picture of this theme is that curiosity about artificial intelligence is widespread but not equally intense among all teachers. Below are some participant statements related to this theme:

"Acquiring new knowledge in a new field is very interesting." (K19)
"It attracts my interest because it attracts the children's interest." (K15)
"I don't find it very interesting because I don't find it reliable." (K16)

Table 15 presents sub-themes related to teachers' perceptions of the cost of using artificial intelligence tools. Findings related to the cost theme indicate that teachers evaluate the use of artificial intelligence not only in terms of its advantages but also in terms of its potential burdens and risks. Participants indicated that artificial intelligence carries significant concerns such as creating a tendency towards laziness, increasing the risk of screen

addiction, limiting creativity, and data security. It was also stated that AI technology has resource-based costs such as time consumption, mental load, and financial accessibility. However, some participants emphasised that these costs are balanced by the conveniences provided in the teaching process. The findings reveal that cost-benefit analysis is an area that requires caution and attention for teachers. Below are some participant statements as examples within the relevant theme:

Table 15. Sub-themes of Cost Value Regarding Artificial Intelligence Tools According to the Opinions of Preschool Teachers

Sub-Themes	Participants
1. Perceived Risks	K1, K2, K3, K4, K6, K9, K10, K11, K12, K13, K14, K15, K16, K17, K18, K19
2. Resource Consumption and Workload Costs	K2, K3, K4, K5, K6, K8, K9, K10, K11, K13, K14, K16, K17, K18, K19

“Overuse can make people forget to think and research. People may become lazy, thinking that there is a brain thinking for them anyway.” (K13)
“Not having sufficient awareness on this subject and the security risk worry me.” (K3)
“It takes up so much of my time that my paperwork is falling behind.” (K2)
“Most of the time it makes things easier, but sometimes it tires my mind because it feels like keeping up with these innovations is a separate responsibility.” (K19)

When the qualitative findings are examined holistically, it is seen that preschool teachers’ perceptions of artificial intelligence tools have a multi-layered structure. Teachers define artificial intelligence as an element that supports teaching processes, enriches learning, and strengthens their professional roles on the one hand; on the other hand, they also mention the cognitive, ethical, and practical costs that come with its use. The themes emerging within the Expectancy–Value Theory framework show that teachers’ expectations regarding these technologies are a dynamic process that develops with experience, while value attributions vary in terms of attainment, utility value, intrinsic/interest value, and cost dimensions. The findings reveal that the use of artificial intelligence is evaluated in terms of both its supportive and limiting aspects in teachers’ professional positioning; this indicates that teachers make a multifaceted assessment when integrating technology into their pedagogical practices.

Discussion

This study aimed to determine preschool teachers’ motivation to use artificial intelligence. The quantitative analysis of the study was conducted using QAIUM, developed by Yurt and Kaşarcı (2024). The qualitative analysis of the study was conducted by the researchers using a semi-structured interview form based on Expectancy-Value Theory with preschool teachers. The findings of the mixed-methods study were analyzed in both quantitative and qualitative terms. The results obtained in this context are discussed comparatively in this section.

A key finding from the study's quantitative results is that the number of female teachers exceeds that of male teachers. This is mainly due to the fact that, according to the 2024-2025 statistics of the Ministry of Education (2025b), of the total 81,263 teachers working in preschool education in Turkey, 75,734 are female and 5,529 are male. Globally, in early childhood education and care (ECEC) programs, similar to Turkey, the vast majority of teachers are women (Khamis et al., 2025). This situation limits the generalizability of differences due to gender.

The descriptive statistics of the study indicate that the vast majority of preschool teachers utilize artificial intelligence tools in their educational planning processes; however, the rate of using these tools during teaching drops significantly. This result is consistent with the study by Kölemen and Yıldırım (2025). Participants in the study reported that their lack of AI literacy and low expectancy stemmed from insufficient knowledge of AI-related content and infrastructure, physical inadequacies in classrooms, and a lack of suitable materials. Furthermore, preschool teachers in this study expressed concerns that, despite the widespread use of AI in early childhood education, the potential for personal data security breaches and the violation of children's privacy led to constraints in integrating it into their processes. Lamanauskas (2025) also states that artificial intelligence at the preschool and elementary school levels reduces teachers' workload, improves children's individual learning experiences, and positively affects the development of innovative learning methods. However, the study also indicates that artificial intelligence may negatively affect critical thinking and literacy skills, weaken memory, and raise ethical issues due to the risk of fraud. In parallel, Chounta et al. (2022) concluded that K-12 teachers' limited knowledge of artificial intelligence causes concern about its use, yet they find AI useful for accessing multilingual content. When these results are evaluated together, although the use of artificial intelligence in preschool education is widespread in the teaching planning process, teachers' ethical concerns about artificial intelligence and physical hardware deficiencies in the teaching process limit its use. In addition, for artificial intelligence to fully realize its potential in preschool education, it is critically necessary to increase teachers' professional development needs and application experience. The role of innovative technologies in improving quality monitoring processes in early childhood education is also significant at this point. Virtual observations, AI and large language model-based tools, and mobile platforms have been shown to support accessibility, accuracy, and integration in quality assurance processes. However, ethical concerns, lack of evidence in AI-related studies, and the difficulties AI may cause in adapting to the process stand out as significant limitations of AI (Khasanova, 2025). It has been determined that an AI-supported teaching system in a disadvantaged area improves the learning process by eliminating inequality of opportunity in preschool quality processes, increasing resource utilization, facilitating lesson planning, and ensuring children's active participation in the process (Zhang & Zhou, 2025). Consequently, it is believed that the balanced application of these technologies by expert teachers will strengthen early childhood education systems.

When examining the technological tools most frequently used by preschool teachers in the study, smartphones clearly stand out, followed by computers. Other technological tools (tablets, televisions, projectors, etc.) are limited in terms of both usage and material production. Konca and Tantekin Erden (2021) similarly reported that preschool teachers frequently use televisions, computers, and smartphones in their classrooms. In a study comparing preschool education in eight countries (Cyprus, Denmark, Estonia, Greece, Italy, Spain, Turkey, and the United States of America (USA)), the technological tools that teachers reported children had access to in early

childhood centers were tablets and computers, respectively. However, television, which was commonly used in early childhood education centers during the period when technology was integrated into classrooms, is no longer employed in the four countries examined in the study (Denmark, Greece, Spain, and the USA) (Slutsky et al., 2021). These findings indicate that, while the use of technology in preschool education is becoming increasingly diverse, there is a growing trend toward the use of individual or portable devices, such as smartphones and computers. Furthermore, the fact that television has been completely removed from classrooms in some countries suggests a growing trend toward more interactive and individualized digital tools in early childhood education, rather than relying on passive screen use.

In the analysis conducted by gender, it was concluded that male teachers had a significantly higher perception than female teachers only in terms of expectancy, while no significant difference was found in other value dimensions (attainment, utility, intrinsic value, and cost). Similarly, the studies by Yeniçeri and Kenan (2025) showed that male teachers had a more positive attitude towards artificial intelligence than female teachers. In contrast, the studies by Arıkanoğlu and Yaman Lesinger (2024) found that female teachers had a more positive attitude towards artificial intelligence than their male counterparts. The fact that men have higher self-confidence than women in using artificial intelligence technologies has also been supported by various studies in the literature (Cai et al., 2017; Latif et al., 2023).

Analyses based on age variables showed no significant difference in teachers' motivation dimensions regarding AI use. Although the 26–30 age group had relatively higher scores for expectancy, attainment, utility, and intrinsic value compared to other groups, these differences were not statistically significant. In contrast, studies suggest that age does not play a decisive role in the use of artificial intelligence (Göksu & Göksu, 2024; Mert Burtgil, 2024; Muzaffer & Ünal, 2025). This result indicates that teachers' adaptation to artificial intelligence may be high regardless of age.

Analyses based on professional experience revealed a significant difference only in terms of expectancy, with teachers who had 6–10 years of experience scoring higher than other groups. In contrast, no significant differences were found in other motivation dimensions. However, studies suggest that experience does not play a decisive role in the use of artificial intelligence (Çayak, 2024; Göksu & Göksu, 2024). Furthermore, İçen (2024) stated that teachers' levels of awareness of artificial intelligence varied according to their length of service, with teachers having 11–20 years of experience showing higher awareness than those with 21 years or more of experience. This suggests that teachers can gain the knowledge, skills, and belief to use AI tools effectively once they reach a certain level of experience.

Analyses based on graduation status reveal that graduate teachers have significantly higher levels of expectancy, benefit importance, and intrinsic value. There is no significant difference in the benefit dimension, and in the cost dimension, the graduate group perceives the process as more laborious, with a higher perception of time and effort. Contrary to the findings of this study, research conducted by Galindo-Domínguez et al. (2024) indicates that a positive attitude toward artificial intelligence is more effective in determining teachers' high digital expectancy, regardless of their educational level, gender, age, years of experience, or field of study. Similarly, other studies

have found that educational status does not influence attitudes toward artificial intelligence (Acet et al., 2024; Aksakal Taşkıran et al., 2024).

The frequency with which teachers use AI tools in the educational planning process creates significant differences in terms of expectancy, attainment, utility, and intrinsic value levels; those who use them regularly have higher motivation scores across all dimensions than those who use them occasionally or not at all, while the perception of cost is highest among those who never use them and lowest among those who use them regularly, indicating that regular use increases expectancy and motivation and reduces perceived cost. This finding is consistent with research results indicating that teachers view artificial intelligence as an effective, important, and high-quality tool for reasons such as planning the educational process, enhancing the effectiveness of material design, and enriching lessons through stimuli (Köse et al., 2023; Küçükkara et al., 2024).

The frequency with which teachers use artificial intelligence tools during lessons creates significant differences in their motivation levels; those who use them regularly have the highest motivation scores in terms of competence, usefulness-importance, benefit, and intrinsic value, while those who never use them have the highest scores in terms of perceived cost, indicating that regular use increases motivation and reduces perceived cost. Studies by Seyrek et al. (2024) also support this finding. The study indicates that teachers frequently use AI tools in their lessons and find developments related to AI positive and exciting. However, it is also observed that teachers who avoid using AI in their lessons, contrary to the general trend, express the view that AI increases costs (Köken & Dagal, 2024).

The study examined preschool teachers' motivations regarding artificial intelligence within the framework of Expectancy-Value Theory. In this context, the QAIUM scale was utilized in the quantitative research section, comprising five dimensions: expectancy, attainment, utility value, intrinsic/interest value, and cost. In the qualitative dimension, the developed interview form was structured based on Expectancy-Value Theory; questions were created in line with the themes of expectancy, value (attainment, utility value, intrinsic/interest value, cost).

The study found that preschool teachers have a high level of perceived expectancy in using artificial intelligence tools. However, when examining participant statements, teachers indicated that they did not feel completely expectant due to the rapidly changing nature of AI technology. Therefore, they stated that they tried to improve their skills through trial and error, repetition, and individual effort. Some participants in the study stated that they attempted to increase their confidence by trying out AI tools multiple times before using them in the classroom. They sometimes felt anxious about solving any errors they might encounter, but generally believed they could overcome them. However, it is understood that as they used AI tools effectively, their sense of achievement increased, and the ease provided in tasks such as material preparation, lesson planning, and organizing student feedback strengthened teachers' perceptions of self-efficacy.

Furthermore, participants emphasized that they still require support in areas such as issuing the correct commands to obtain the desired output, selecting the appropriate tools, and adhering to ethical usage conditions. These results reveal that preschool teachers' expectations regarding their use of AI tools are reinforced by experience, and this

process increases and develops their motivation. Similarly, a study conducted by Su and Yang (2024) with preschool teachers also highlights ChatGPT as a powerful tool. This study demonstrates that artificial intelligence facilitates the effective design of teaching activities, promotes stimulus diversity by suggesting various materials during learning processes, such as language learning activities, and enhances teachers' work efficiency while improving their job satisfaction. However, unequal access to this technology poses an obstacle to teachers' success in diversifying the educational process. Tuomi's (2022) study also views artificial intelligence as an important tool among 21st-century educational practices for teachers, aiming to impart skills and experiences that are non-epistemic and do not directly provide information. The research results indicate that the use of artificial intelligence tools can enhance learning outcomes through technological experiences, thanks to the increased self-efficacy and motivation of preschool teachers.

The quantitative findings of the study show that preschool teachers generally evaluate AI tools positively in terms of value dimensions. High scores in the sub-dimensions of usefulness-importance, benefit, and intrinsic value reveal that teachers find AI tools functional, interesting, enjoyable, and pedagogically satisfying. In contrast, the moderate scores in the cost dimension indicate that teachers perceive the process of learning and using AI tools as more costly in terms of time, effort, and cognitive load. The qualitative findings of the study also support these results.

When linked to the interview questions, the value classification within the scope of the attainment dimension reveals that preschool teachers view artificial intelligence as compatible with their professional values and educational understanding. Teachers also stated that artificial intelligence enriches children's learning experiences, helps them adapt to the technological age's requirements, and supports their professional development. Furthermore, teachers view artificial intelligence as a valuable tool for developing innovative and effective teaching methods; however, they emphasize the need to support children's development in all aspects and to use technology in a measured and responsible manner. This finding is also consistent with the results obtained from quantitative analysis. Samara and Kotsis (2024) similarly emphasize that AI tools are innovative and effective teaching methods, concluding that their use by preschool teachers in teaching processes enables children to participate in the learning process actively and that AI is important because it supports children's mental potential and creativity. Additionally, Brito et al. (2018) emphasized the importance of artificial intelligence in preschool education, determining that AI toys support children's inquiry and discovery skills by establishing human-like interactions with them. Another study contributes to the literature by showing that the use of AI-enabled toys in conjunction with physical and digital environments develops children's inquiry skills and emphasizes the need to strengthen the professional competence of preschool teachers so that they can effectively use such robotic toys (Kewalramani et al., 2021; Özer et al., 2023).

Teachers state that they use artificial intelligence tools within the utility dimension of value classification, specifically to increase student interest, personalize learning, and make lessons more interactive during the teaching process. At the same time, AI tools save time in preparing activities and materials, enable the visualization of complex concepts, and facilitate the development of activities suitable for different learning styles. Furthermore, these tools make classroom management easier by allowing lesson content to be adapted to students'

levels and interests and enabling more time to be devoted to classroom interaction. Teachers stated that they view artificial intelligence not only as a tool to capture students' attention and make lessons more engaging, but also as a resource that supports their professional development. This finding is consistent with the results obtained from quantitative analysis. Similar to the research findings, Qayyum et al. (2024) emphasize in their study that preschool teachers believe AI tools improve targeted learning outcomes and that, in addition, senior teachers in the field believe AI feedback contributes to the learning process. At the same time, their views on the effectiveness of artificial intelligence in lesson planning, material creation, and the assessment process contribute to the usefulness of artificial intelligence in providing motivation (Kaya & Köseoğlu, 2024). In contrast, Köken and Dagal (2024) found that preschool teachers possess theoretical knowledge about artificial intelligence but lack sufficient practical experience. For this reason, teachers stated that they avoided using artificial intelligence to increase children's learning efficiency in the classroom.

Teachers find using artificial intelligence technologies within the intrinsic/interest value dimension of the value classification quite interesting and motivating. For teachers, artificial intelligence enables them to make the teaching process more efficient, develop their own professional skills, and provide children with individual learning experiences. Teachers stated that being open to new technologies encourages them to continually renew themselves, and that being part of the transformation in education is inspiring. They also expressed their excitement about developing themselves by sharing their experiences with their colleagues. Some teachers, however, pointed out that this interest and motivation may decrease if artificial intelligence recommends unreliable sources or produces unreliable results. This finding is consistent with the results of quantitative analysis. It aligns with the findings of Akdeniz and Özdinç (2021), who developed an AI-based toy for preschool children and found that it increased children's academic achievement and that its engaging nature boosted their desire to learn. In another study, teachers' views that AI is a tool that provides lasting learning opportunities, increases student motivation, and supports learning processes emphasizes the effect of AI on increasing children's motivation (Köse et al., 2023).

Teachers state that the use of artificial intelligence within the "cost" dimension of value classification brings both advantages and challenges in terms of time and energy. It has also been noted that artificial intelligence saves teachers time in planning activities and reduces their professional workload. However, the financial costs incurred due to paid artificial intelligence tools and the necessity of constantly engaging with technological tools are also cost factors that teachers perceive as relatively high. This finding is consistent with the results obtained from the quantitative analysis. This result is supported by Küçükkara et al. (2024)'s research, where preschool teachers mentioned time savings and the possibility of individualized planning as positive aspects of artificial intelligence. Additionally, studies supporting the findings of this research have also determined that artificial intelligence reduces teachers' workload and saves time (Cojean et al., 2023; Özer et al., 2023; Xu & Ouyang, 2022; Xuan & Yunus, 2023). Consequently, while teachers acknowledge the time savings and efficiency advantages provided by artificial intelligence, they also consider factors such as cost, difficulty, and additional effort that arise during the implementation process, emphasizing that these circumstances may affect their motivation to use it.

Conclusion and Recommendations

In conclusion, when the quantitative and qualitative findings of the study are considered together, it becomes apparent that preschool teachers' motivation towards artificial intelligence is shaped within the framework of various variables. Teachers' regular use of artificial intelligence tools significantly increases their perceptions of competence, their assessments of the benefits and importance of technology, their perceived levels of benefit, and their internal value attributions; conversely, as frequency of use decreases, perceived costs increase. This situation demonstrates that AI experience not only enhances technical competence but also positively impacts teachers' psychological readiness and professional motivation. However, the higher cost perception of teachers who avoid using AI in their lessons indicates that cognitive and affective barriers that hinder the adoption of technology in educational environments persist. At the same time, it has been determined that individual experience, digital competence, and usage habits largely influence teachers' motivation regarding artificial intelligence, while gender is a factor related to limited and specific dimensions. At the same time, it has been determined that individual experience, digital literacy, and usage habits significantly influence teachers' motivation regarding artificial intelligence, while gender is a factor related to limited and specific dimensions. When evaluated in conjunction with similar studies in the literature, the finding that teachers proficient in digital fields develop more positive attitudes towards artificial intelligence suggests that both technological knowledge and self-efficacy perception play a significant role in integrating artificial intelligence. These findings emphasize the importance of strengthening digital pedagogical competencies in teacher training programs, providing practical examples of usage, and offering guidance on the safe and effective implementation of AI-supported teaching processes to increase preschool teachers' motivation towards AI.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** In this study, all rules stated to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions stated under the title "Actions Against Scientific Research and Publication Ethics", which is the second part of the directive, were not taken.

Ethical review board name: Selçuk University Education Faculty Ethics Committee

Date of ethics review decision: 22.09.2025

Ethics assessment document issue number: 1087851

***Statement of Interest*:** We have no conflict of interest to declare.

Data Availability Statement: Data is available on reasonable request from the authors.

Author Contributions: All authors contributed to the conceptualization, methodology, data collection, formal analysis, data curation, writing–original draft preparation, writing–review and editing, visualization, and supervision. All authors read and approved the final manuscript.

***Funding*:** None

***Acknowledgments*:** None

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International Journal of Current Educational Studies

2025, Vol. 4, No. 2, 30-52 ISSN 2822-4914

AI in Rural Classrooms: Challenges and Perspectives from South African Educators

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Article Info

Article Type

Original Research

Article History

Received:

22 July 2025

Accepted:

03 September 2025

Published online:

04 September 2025

Abstract

Despite growing interest in artificial intelligence (AI) in South African education, limited research has examined how rural educators perceive and navigate AI integration. This study explores educators' perspectives, adaptive strategies, and lived realities in under-resourced rural schools. Eight educators from Eastern Cape, Limpopo, Mpumalanga, and North-West provinces were purposefully selected. Data were collected through written responses and semi-structured online interviews, and were analyzed thematically. Ethical safeguards included informed consent, pseudonyms, and confidentiality. Findings reveal that AI integration is hindered by inadequate digital infrastructure, unreliable connectivity, and limited access to devices. Educators also face insufficient digital literacy and a lack of professional development, leaving them underprepared for AI-supported teaching. Weak institutional support and gaps between policy and practice further constrain adoption. Moreover, AI tools often remain linguistically and culturally misaligned, reducing learner engagement. Equity and ethical concerns—access, data privacy, and algorithmic bias—raise the risk of exacerbating educational inequalities rather than reducing them. This study underscores the need for targeted investment in digital infrastructure, contextualized teacher training, and inclusive AI design that reflects local languages and cultures. The findings extend beyond South Africa, contributing to global debates on equitable AI adoption in education across the South.

Keywords: AI-driven teaching, Rural Schools, Teacher Perspectives, Digital Inequality, South Africa.

Citation:

Mokoena, O. P., & Seeletse, S. M. (2025). AI in rural classrooms: Challenges and perspectives from South African educators. *International Journal of Current Education Studies (IJCES), 4*(2), 30-52. https://doi.org/10.46328/ijces.199

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Introduction

The speedy acceptance of artificial intelligence (AI) technologies in education is molding teaching and learning globally (Temimi et al., 2025). According to Strielkowski et al. (2025), AI offers a unique potential to personalize learning experiences, automate administrative tasks, and provide adaptive feedback. This way, AI encourages educational effectiveness and engagement. Universally, according to Hashim et al. (2022), educational systems are steering AI-driven tools to customize instruction to varied learner needs, expand access to quality resources, and acquire modern-day skills. This universal momentum highlights the transformative aptitude of AI to create more dynamic, learner-centred educational settings. However, the integration of AI in education is not even, mainly in rural settings where infrastructural, socio-economic, and pedagogical challenges abound (Obuseh et al., 2025). Djuraev et al. (2025) concur that rural education, with limited resources, inadequate digital access, and shortages of educators, experiences unique barriers to leveraging AI's benefits. Rusca et al. (2023) explain that in South Africa, these challenges are intensified by past inequalities, infrastructural deficits, and complex socio-political contexts. Hence, understanding how rural educators perceive and steer AI integration is essential to safeguarding that AI-driven developments do not intensify existing divides but add to more equitable educational outcomes. This study explores these dynamics through the lived experiences of educators in four rural South African provinces [Eastern Cape, Limpopo, Mpumalanga, and North-West]. It situates the views of these educators within broader discourses on educational technology adoption, digital equity, and policy frameworks. It highlights important concerns for developing inclusive, context-sensitive AI education strategies that address systemic susceptibilities exclusive to rural settings.

This study concerns four predominantly rural South African provinces [Eastern Cape, Limpopo, Mpumalanga, and North-West], each representing unique educational landscapes molded by socio-economic and past factors impacting technology adoption (Mathinya, 2024). These provinces signify contexts where rural educational challenges converge with the emerging opportunities and risks of AI in education. Their selection allows for an in-depth exploration of how digital divides manifest and how local educators negotiate AI integration within systemic constraints. It highlighted issues of equity, inclusion, and capacity-building.

The Eastern Cape is among the poorest of South Africa's nine provinces (Ngumbela, 2023). It consists of regions that used to be former independent homelands of Ciskei and Transkei under different Xhosa [ethnic group] leaders. Many of its rural schools lack adequate infrastructure, such as electricity and internet connectivity. These infrastructural deficits hinder the introduction of digital learning tools and exacerbate educational inequalities. The region is predominantly Xhosa, but other ethnicities, black and white, also live there. Limpopo is also very poor (Nchabeleng, 2025). Major ethnicities are Pedi (northern Sotho), Venda, and Tsonga (also known as Shangans). The regional education system is defined by high learner-to-educator ratios, limited digital resources, and insufficient educator training in emerging technologies, which jointly impede effective AI integration. Mpumalanga, dominated by Ndebeles and then Swatis [Swazis] with other ethnicities in lower scales, blends rural and peri-urban contexts (Matimolane & Mathivha, 2025). However, it faces disparities in resource allocation and professional development, resulting in uneven capacity among educators to incorporate digital platforms meaningfully. North-West, an area consisting mainly of Setswana speakers, an opulent Bophuthatswana homeland

before democracy days, thus living in its shadows, scuffles with socio-economic deficiency and intermittent network coverage (Mokone, 2023). This province is now among the poorest, and this restricts students' and educators' access to online AI-enhanced educational resources.

Theoretical Framework

This study builds on Thongprasit and Wannapiroon's (2022) model of AI integration in education, identifying four interrelated components crucial for understanding AI adoption in education, particularly within the South African rural context. As illustrated in Figure 1, these components work synergistically to influence the successful implementation of AI-enhanced learning environments.

The framework encompasses four elements that interact dynamically to shape AI integration outcomes. First, end-users, including educators and learners, represent the human dimension of AI adoption. This component is particularly significant in rural contexts, where key concerns are directed at exclusion and empowerment within marginalized communities. The success of AI integration fundamentally depends on how these stakeholders engage with and benefit from technological innovations.

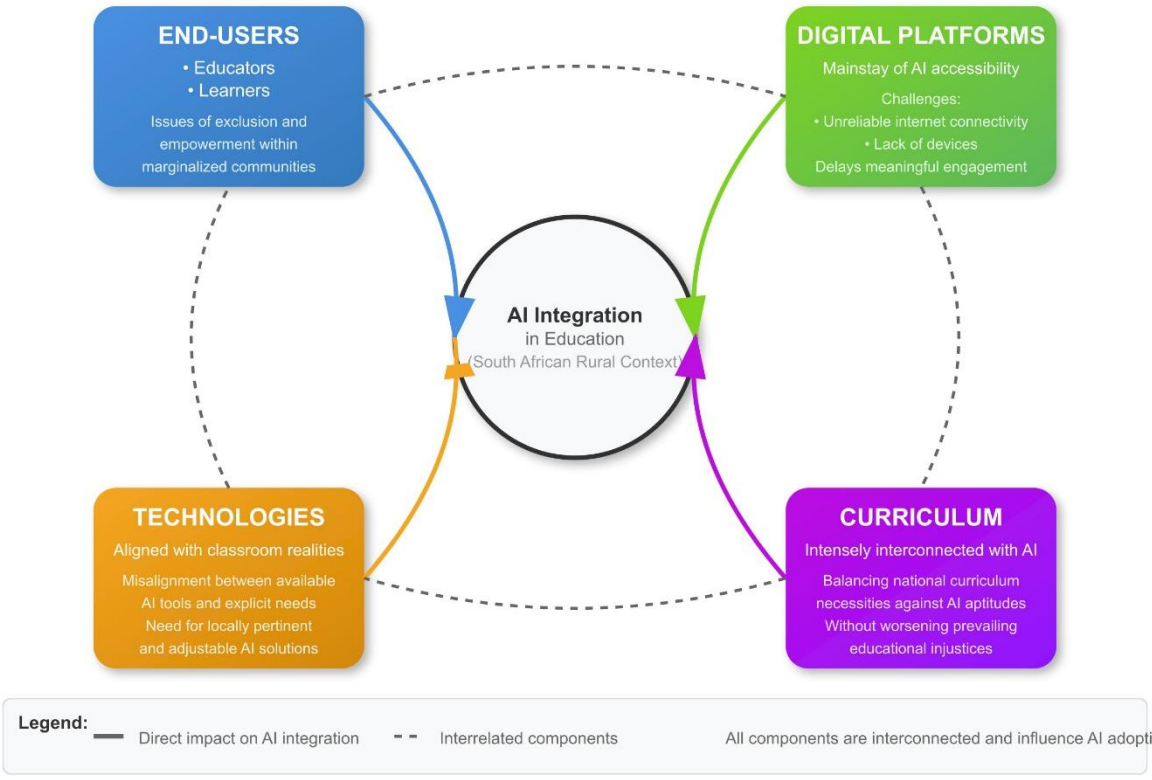

Figure 1: AI Integration in Education: Four Interrelated Components Frameworks (developed by the author)

Second, digital platforms create the technological mainstay of AI accessibility, serving as the primary conduits through which AI tools reach educational settings. However, significant challenges emerge in rural areas, where unreliable internet connectivity and a lack of appropriate devices significantly impede meaningful engagement

with AI-enhanced learning environments. These infrastructural limitations create barriers that must be addressed for effective AI implementation.

Third, the selection and deployment of technologies must be carefully aligned with the contextual realities of rural classrooms. The current misalignment between available AI tools and the explicit needs of rural education highlights the critical importance of developing locally pertinent and adjustable AI solutions. This component emphasizes that technological choices cannot be made in isolation but must respond to the specific requirements and constraints of the educational environment.

Fourth, curriculum integration represents the most complex component, as the incorporation of AI into education is intensely interconnected with existing curricular structures. The challenge lies in balancing national curriculum necessities against the capabilities and potential of AI technologies. This delicate balance is crucial to ensure that AI integration enhances rather than disrupts educational goals, and does not worsen prevailing educational injustices that already affect rural communities.

As depicted in Figure 1, these four components—end-users, digital platforms, technologies, and curriculum—are not independent entities but interconnected elements that collectively determine the success of AI adoption. Together, they emphasize the complexity of encouraging meaningful AI integration in education systems shaped by diverse curricular, infrastructural, social, and technological dynamics. The framework thus provides a comprehensive lens through which to analyze and understand the multifaceted nature of AI implementation in rural educational contexts.

Literature Review

Rural educators, particularly in low- and middle-income countries, where developmental leadership remains stagnant, struggle with entrenched systemic barriers that compromise the quality and efficacy of their educational practices (Ashta et al., 2025; Awashreh, 2025). In South Africa, the heterogeneity of rural contexts spanning vast geographic expanses and diverse cultural landscapes highlights a shared reality where educators consistently report chronic deficits in institutional support, infrastructural inadequacies, and resource scarcity. Despite these constraints, educators and learners show a marked openness to technological innovation, such as generative AI. The COVID-19 pandemic, as Al Mulla et al. (2025) argue, catalyzed a rapid and relatively effective uptake of digital platforms, accelerating digital literacy and integration. Romaioli (2022) further highlights the transformative potential of generative AI in education, highlighting its capacity to personalize content delivery and deepen learner engagement. In parallel, Indonesian studies (Aisyah et al., 2023; Nuryadin & Marlina, 2023) emphasize AI's role in enabling real-time data-driven decision-making and adaptive curriculum design. However, the post-lockdown period has revealed a persistent bottleneck, i.e., the absence of coordinated institutional backing (CIB), which Bacolod (2020) identifies as a critical impediment to AI's sustainable and meaningful integration in educational ecosystems. Worth noting, embedding AI in rural education aligns directly with Sustainable Development Goal 4 (SDG 4), which champions inclusive, equitable, and high-quality education (Heleta & Bagus, 2021; Raimi et al., 2024; Wang et al., 2025).

Slimi and Carballido (2023) conceptualize integrating artificial intelligence (AI) into educational settings as a multidimensional innovation capable of enhancing learning outcomes, increasing student engagement, and streamlining instructional efficiency. As a transformative technological infrastructure, generative AI intersects with critical facets of the teaching and learning continuum, including assessment automation, intelligent grading systems, and future-oriented skills development. However, recent reports indicate that approximately 76% of educators in the United States abstain from incorporating AI tools into their pedagogical routines (Castro et al., 2025; Murphy, 2019; Ng et al., 2023). Among those who do, Göçen and Döğer (2025) note that generative AI is primarily leveraged for communication, personalized instruction, and lesson design. In Singapore, hesitancy persists, with educators expressing uncertainty about the pedagogical value of generative AI due to ambiguous institutional oversights (Thilakarathne et al., 2025). Despite these reservations, generative AI presents unprecedented opportunities for democratizing access to knowledge, reimagining pedagogical models, and tailoring learning experiences to individual needs. Furthermore, it is a disruptive force, challenging legacy systems and prompting a reconfiguration of educational structures and practices (Estrellado & Miranda, 2023). To navigate this complexity, researchers have proposed various theoretical frameworks. Notably, Thongprasit and Wannapiroon (2022) introduced an inclusive model comprising four interdependent dimensions, i.e., end-users (educators and learners), digital platforms, intelligent technologies, and curricular alignment. This framework highlights generative AI's potential to foster creativity, empower educators, and facilitate responsive, learner-centered instruction. However, a critical gap remains, i.e., empirical evidence is still sparse regarding the practical translation of these theoretical advancements into the lived realities of educators operating in rural and resource-constrained environments. Bridging this gap is essential for ensuring equitable and sustainable generative AI adoption across diverse educational landscapes.

Despite the proliferation of generative AI initiatives in educational settings, the practical implementation of generative AI in classroom management and instructional strategies remains challenging, particularly in environments constrained by limited information and communication technology (ICT) infrastructure. As digital tools and generative AI systems continue to evolve, the systematic documentation of educators' lived experiences becomes imperative for ensuring educational innovation's inclusivity, relevance, and sustainability. However, a critical, notable gap persists in understanding educators' day-to-day realities and adaptive strategies navigating generative AI integration within diverse socio-cultural and infrastructural contexts. This study seeks to address this gap by exploring the lived experiences of educators from under-resourced rural regions in South Africa's Eastern Cape, Limpopo, Mpumalanga, and North-West provinces. The study explores four interrelated dimensions: (i) educators' experiential narratives and reflections on implementing AI-driven instructional strategies; (ii) the coping strategies they deploy to mitigate technological and institutional constraints; (iii) their insights into the transformative potential of AI in shaping pedagogical effectiveness; and (iv) the underlying factors that account for both convergences and divergences in their experiences across different rural contexts.

Topical global studies confirm that AI possesses transformative potential in rural education by addressing historical systemic hindrances such as scarcity of resources, shortage of educators, and problems caused by language issues. Tripathi et al. (2025) emphasize the ability of AI to create customized learning experiences,

flipped virtual classrooms, and natural language processing tools that can conquer disparities caused by geography and language. AI can contribute to educational equity between rural and urban areas. However, they highlight that challenges caused by infrastructure inadequacies, high costs of implementation, and insufficient educator training are substantial obstacles to the sustainable adoption of AI in these contexts.

From a viewpoint of digital equity, scholars (Ciaschi & Barone, 2024; Fiegler-Rudol, 2025; Judijanto et al., 2025) believe that access solely to AI tools is deficient. Complete digital equity entails the provision of devices, connectivity, skills, empowerment, and institutional support, among others, to enable expressive involvement in AI-enhanced learning atmospheres (Canevez et al., 2020; Liu et al., 2024). The unequal distribution of the benefits of AI risks intensifying prevailing divides if equity is incorporated in policy and practice.

Critical pedagogy scholars offer an important lens through which to examine AI integration in education (Murtiningsih & Sujito, 2024; Yadav, 2025). Gonsalves (2024) and Ncube and Tawanda (2025) concur by cautioning that generative AI may challenge practices engrossed in intellectual dialogues, autonomy, and democratic involvement. They warn that excessively depending on AI-generated knowledge can weaken reflective thinking and critical awareness, which is basic to liberatory education. As a substitute, AI should be a tool for supporting active, considerate learning that preserves learner activity and ethical perception.

Kim and Wargo (2025) believe that in rural STEM education contexts, educational leaders are optimistic about the capacity of AI to customize instruction for mixed-ability classes, decrease the burdens of administration, and open opportunities to advanced learning that is naturally not available in rural schools. However, Kim and Kim (2020) and Joseph and Uzondu (2024) consider such opportunities to be dependent on resolving infrastructural and professional development deficits. These opportunities require educational leaders to advocate for a culture that promotes resources and innovation. In addition, outlines for digital equity progressively promote a system-level tactic towards AI in education. According to Albannai and Raziq (2025), this approach includes leadership, intelligible policies, reliable access, digital capability, and authorized, technology-driven learning experiences that address many dimensions outside access alone to accomplish impartial AI integration.

The topical guidelines of the Organisation for Economic Co-operation and Development (OECD, 2023a; 2023b; 2024) emphasize the potential of AI for impartiality and inclusion by enabling adaptive learning, intelligent tutoring, and inclusive support for diverse learners. These would include learners with special needs. However, they also feature risks such as biases, privacy, socio-emotional, and technology-enabling impacts that require management to thwart reinforcement of inequalities. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) emphasizes the capability of AI to modernize teaching and hasten progress towards inclusive education goals (Xiao & Bozkurt, 2025). Positioning AI incorporation in rural education within wider dialogues on digital impartiality and critical education points to a detailed, contextualized approach. The goal is technological adoption and encouraging learner-centred, socially objective educational ecosystems that empower sidelined rural educators and learners (Indriyani, 2025). This goal entails strategic infrastructural savings, educational empowerment, critical reflection on the educational impacts of AI, and inclusive policy agendas.

Collectively, such agendas are those that collectively inspire impartial, sustainable AI-empowered learning situations worldwide and in South Africa's rural provinces.

Aim of the Study

This study explores how rural educators in four South African provinces [Eastern Cape, Limpopo, Mpumalanga, and North-West] perceive and accomplish the incorporation of AI in education. The study seeks to understand the lived experiences of these educators within the broader situation of educational technology adoption, digital equity, and policy frameworks, to inform inclusive and context-sensitive AI education strategies that address exclusive rural challenges. The research question emerged: How do educators in rural South African provinces perceive and navigate the incorporation of AI technologies in education, and what implications do their experiences have for developing equitable, context-sensitive AI education strategies?

Method

Design and Setting

This study employed a qualitative research design to explore the lived experiences and pedagogical insights of rural school educators across four economically disadvantaged South African provinces, Eastern Cape, Limpopo, Mpumalanga, and North-West, regarding the integration of generative AI-driven teaching strategies in classroom settings. An exploratory approach was chosen for its capacity to uncover detailed, context-rich understandings of complex phenomena that are often obscured by quantitative methods (Lim, 2025). It enables researchers to explore the intersection of technology and pedagogy within the authentic realities of the rural education context.

Sampling

To ensure relevance and depth, the purposive sampling technique was used to identify educators with direct experience in applying generative AI tools to facilitate learning (Kayaalp et al., 2025). In addition, extreme variation sampling was employed to capture a wide spectrum of perspectives, drawing from educators with diverse teaching contexts, technological exposure, and institutional support levels (Rubach & Lazarides, 2025). This strategy enhanced the representativeness of the sample by maximizing variation in background variables related to the phenomenon under study. The final sample achieved through saturation comprised eight participants, with two educators selected from each of the provinces.

Data Collection

All participants were affiliated with schools that had implemented generative AI-related instructional strategies. Data collection was conducted through a combination of written reflections and online semi-structured interviews, guided by a flexible interview protocol that ensured consistency across cases while allowing for the exploration of emergent themes. Participants were invited to share their experiences with generative AI tools, the challenges encountered, the coping mechanisms adopted, and their reflections on their role in shaping effective teaching

practices.

Informed consent was obtained from all participants prior to data collection. Participants were briefed on the study's objectives, assured of confidentiality, and informed of their right to withdraw at any stage. To protect their identities, pseudonyms and participant codes were used in all documentation and reporting.

Data Analysis

Data were analyzed using Thematic Content Analysis (TCA), a well-crafted method for identifying patterns and constructing meanings from qualitative data (Ebrahim & Rajab, 2025). This analytical approach facilitated the development of core themes that encapsulate the study's findings. Ethical considerations were rigorously observed throughout the research process.

Qualitative Coding and Trustworthiness Procedures

To enrich methodological rigor, the coding process was designed using iterative cycles of transparent, axial, and selective coding. This permitted a detailed and orderly investigation of the qualitative data. Preliminary open coding entailed stepwise analysis of transcriptions and replications to identify expressive units that apply to participants' experiences with generative AI integration. Clustering codes into wider categories was done at axial coding stage to explore relations and enhance developing concepts. Selective coding shaped these categories into coherent, principal themes that reproduce the intricate realities of rural educators. Reflexivity was upheld as the primary researchers engaged in continuous self-reflection journals and peer debriefings. This was to recognize and allay likely partialities connected to their positionality, previous conventions about AI in education, and the participants' socio-economic circumstances. To uphold trustworthiness, credibility was established by prolonging interviews and member checking with participants to validate interpretations and clarify ambiguities. The study demonstrated dependability by upholding a detailed audit trail recording all phases of data collection and analysis. A review of these by an external qualitative research expert was undertaken for consistency. Confirmability was upheld by open recording of analytic decisions and impulsive notes. It enabled an audit of the way that data reinforced the findings rather than researcher bias.

Sample Size Justification and Sampling Rationale

In disclaiming, the sample size of n = 8 educators may seem inadequate. However, the study involved careful and thorough purposive and deviant variation sampling to gather an inclusive range of experiences (Ahmad & Wilkins, 2024) across four economically disadvantaged rural provinces. According to White and Fletcher (2025), this approach safeguards the inclusion of assorted teaching contexts, contrasting levels of access to technology, and different institutional supports. As such, it ensures that the sample represents the dynamic veracities of rural educators in South Africa. Furthermore, data collection was rolled out until the accomplishment of thematic saturation. This indicates that the sample delivered rich, inclusive insights into multiplicative AI integration challenges. The qualitative, exploratory design of this study prioritizes depth and contextual insights over scope.

It then makes the findings transferable to comparable rural education locations branded by analogous socio-economic and infrastructural encounters.

Results

he findings of this study are organized thematically to reflect the key challenges and insights shared by rural educators across the Eastern Cape, Limpopo, Mpumalanga, and North-West provinces. From the analysis six core themes emerged, each highlighting critical dimensions of the educators' experiences with AI-driven teaching strategies (see Figure 2). These are discussed below with verbatim responses from each participant.

Figure 2. Six Core Themes of AI Integration Challenges in Rural South African Education

Verbatim Responses

Respondents EC1

“Many communities experience internet connectivity that is either too weak or totally lacking. So, students cannot consistently engage online. Government programs that prioritize developing digital skills or offering schools the essential technology do not exist. Our digital resources are in English, which excludes learners who speak local languages at home.”

Respondent EC2

“Many teachers do not even have a reliable computer at home to prepare digital lessons, let alone students having their own devices. We receive little to no continuous training on how to effectively use technology in the classroom; this leaves many educators feeling overwhelmed. When only some students have access to devices, the digital divide only worsens, deepening existing inequalities.”

Respondents Lim1

“In our school, the few computers we have are outdated and barely functioning, which discourages students from using them. There is a clear need for professional development focused on digital literacy for educators, but these programs are scarce. We must be mindful of protecting students’ data and privacy as we integrate more digital tools.”

Respondent Lim2

"Though urban centers enjoy good connectivity, rural areas remain disconnected, limiting equitable access. Government policies often exist only on paper; effective implementation to support digital education is lacking. Educational platforms rarely consider the cultural context of our learners, which reduces engagement."

Respondent Mpu1

"Investments in digital infrastructure have been insufficient and poorly coordinated, leaving many regions underserved. Without strong institutional backing, it's difficult to scale digital education initiatives nationwide. Learning material should reflect the diverse cultural backgrounds of our learners for better comprehension."

Respondents Mpu2

"Economic challenges make it hard for families to afford devices, and schools don't have resources to fill the gap. Teachers need ongoing support and training, not just one-off workshops, to become confident in using technology. We cannot ignore that some students are being left behind, and that raises serious ethical questions about fairness."

Respondent NW1

"Limited broadband coverage in our region remains a big hurdle to equitable digital learning. There is a disconnect between policymakers and educators, resulting in weak support for digital initiatives. If digital education isn't accessible for all, we risk reinforcing existing social inequalities."

Respondents NW2

"Without devices at home, students cannot complete digital assignments or participate fully in online learning. Many teachers lack the skills to navigate new digital platforms confidently, which affects teaching quality. We must address privacy concerns and establish clear policies to protect learners' digital rights."

Themes Generation and Discussion with Verbatim Response

Theme 1: Inadequate Digital Infrastructure and Limited Connectivity

Across all provinces, respondents consistently highlighted poor internet connectivity and inadequate digital infrastructure as critical barriers to AI integration. EC1 and NW1 emphasized that "many communities experience either weak or non-existent internet access, severely limiting students' ability to engage with online learning platforms". Similarly, Mpu1 and Lim2 pointed to "insufficient and poorly coordinated investments in digital infrastructure, which have left rural schools technologically underserved". These infrastructural deficits hinder the deployment of generative AI tools and exacerbate existing educational inequalities.

Theme 2: Insufficient Access to Devices and Technology

Furthermore, limited access to functional devices emerged as a pervasive issue. EC2 and Lim1 reported that "both teachers and students often lack reliable computers, with some schools relying on outdated hardware". Mpu2 and NW2 further highlighted "the economic constraints that prevent families from affording personal devices, leaving schools unable to bridge the digital divide". This scarcity of devices restricts participation in AI-enhanced learning

and reinforces systemic inequities.

Theme 3: Deficiency in Institutional and Governmental Support

Respondents also expressed concern over the disconnect between policy and practice. EC1 and Lim2 noted "the absence of government programs aimed at equipping schools with essential technologies or developing digital competencies among educators". Mpu1 and NW1 echoed this sentiment, citing "weak institutional backing and ineffective policy implementation as major obstacles to scaling digital education initiatives". The lack of coordinated institutional support undermines the sustainability and scalability of generative AI integration in rural classrooms.

Theme 4: Substandard Educator Training and Digital Literacy

The lack of comprehensive and ongoing professional development emerged as a significant barrier to effective generative AI integration. EC2 observed, "We receive little to no continuous training on how to effectively use technology in the classroom; this leaves many educators feeling overwhelmed." Mpu1 echoed this concern, stating, "Teachers need ongoing support and training, not just one-off workshops, to become confident in using technology." Lim1 added, "There is a clear need for professional development focused on digital literacy for educators, but these programs are scarce." NW2 highlighted the impact of limited digital confidence, noting, "many teachers lack the skills to navigate new digital platforms confidently, which affects teaching quality."

Theme 5: Language and Cultural Relevance Challenges

Participants emphasized the importance of culturally and linguistically inclusive digital content. Lim2 noted, "Educational platforms rarely consider the cultural context of our learners, which reduces engagement," and added, "Our digital resources are in English, which excludes learners who speak local languages at home." EC1 reinforced this concern, stating, "Unavailable digital content in home languages of learners restricts full understanding." The absence of localized and culturally embedded digital resources was seen as a barrier to expressive and meaningful learning experiences.

Theme 6: Equity and Ethical Worries

The integration of generative AI in education raises critical concerns about equity and ethics, particularly in under-resourced settings. Mpu2 warned, "We cannot ignore that some students are being left behind, and that raises serious ethical questions about fairness." NW1 added, "If digital education isn't accessible for all, we risk reinforcing existing social inequalities." EC2 raised concerns about data protection, stating, "We must be mindful of protecting students' data and privacy as we integrate more digital tools." Lim1 emphasized the broader ethical implications, noting, "We must address privacy concerns and establish clear policies to protect learners' digital rights."

Discussion

The findings of this study revealed a complex interplay of structural, pedagogical, and socioculturalsociocultural factors that shape rural educators' experiences with generative AI-driven teaching strategies. Six key themes

emerged: inadequate digital infrastructure, limited access to devices, insufficient institutional support, substandard educator training, challenges related to language and cultural relevance, and concerns around equity and ethics. This discussion section grouped issues to align with the problems highlighted in the themes.

Barriers to Digital Infrastructure in Rural Education

One of the most persistent and structurally embedded barriers to equitable generative AI integration in education is the continued inadequacy of digital infrastructure and unreliable internet connectivity in rural provinces. Respondents across the four provinces consistently described broadband access in their schools as either unstable or absent, severely limiting the feasibility of digital learning. These accounts reaffirm longstanding critiques that infrastructure remains a legacy obstacle to technological equity in resource-constrained education systems (Shumba et al., 2025; Van Deursen & Van Dijk, 2019). The inequalities between urban and rural investment trajectories are unambiguous; urban centers continue to benefit from concentrated infrastructure development, while rural communities remain digitally marginalized. This exclusion is technical and deeply systemic, sustained by fragmented policy frameworks and sluggish implementation efforts. As Boerman et al. (2022) argue, the infrastructural gap is perpetuated by institutional inertia and the absence of coordinated public-private investment strategies. The frustration expressed by educators reflects a broader structural failure to prioritize digital equity, revealing a critical fault line in the pursuit of inclusive educational innovation. According to Nuryanti (2025), the insistent lack of digital infrastructure and unreliable internet connectivity in rural provinces can be openly linked to existing theories of technology adoption, educator agency, and rural education development by demonstrating how systemic infrastructural deficits constrain the ability of educators to incorporate generative AI expressively. According to Rogers' Diffusion of Innovations theory, technology adoption requires responsiveness, interest, and accessible and stable infrastructure. Which rural schools lack, impeding the initial and continued use of digital tools (Kim et al., 2025). Moreover, educator agency is weakened when digital access is unreliable or absent, where educator agency is the educators' capacity to make independent instructional decisions (Mouta et al., 2025). This would limit educators' potential professional autonomy and innovation, mainly in resource-inhibited rural situations with deficient support structures. Boillat et al. (2025) enlighten that rural education development theories explain how old urban-rural differences in investment and policy attention generate rooted disparities, both technical shortfalls and displays of broader socio-political downgrading. Hence, the infrastructural gap is a notable barrier to digital inclusion and rural educators' empowerment as change agents. This shows how disjointed policies and institutional disinterest prolong segregation and restrict impartial technological progress in education.

Challenges of Access in Rural Digital Education

Regarding poor access to devices and technology, respondents from the Eastern Cape and Limpopo highlighted this challenge. This reflects the broader structural reality of the first-level digital divide (FLDD), which Paskaleva (2025) defines as unequal access to physical and economic digital tools. King and Gonzales (2023) argue that obsolete or scarce school hardware restricts engagement and actively widens the digital divide. Economic hardship further compounds this divide, as families and institutions struggle to acquire and maintain appropriate technology. In response to such disparities, several African nations, such as Burundi, Congo, Ghana, Kenya,

Libya, Rwanda, Tanzania, and Uganda, have adopted initiatives like the one laptop per child (OLPC) program (Rwigema, 2020), a nonprofit effort aimed at transforming global education through low-cost, durable, and energy-efficient laptops. As Muthukrishna et al. (2025) explain, OLPC was designed to promote early digital literacy and empower children in developing regions. However, despite its ambitious goals, OLPC faced significant implementation challenges, including rapid hardware obsolescence, high maintenance costs, and inadequate technical support (Amiri, 2025). These limitations highlight the need for more sustainable, context-sensitive strategies to bridge the FLDD and ensure that digital transformation in education does not remain a privilege of the urban elite but becomes a reality for all learners. Underprivileged access to technological devices in rural Eastern Cape and Limpopo echoes the first-level digital divide (Ghimire & Mokhtari, 2025). Ragnedda and Ruiu (2025) add that this restricts technology adoption and educator agency. The initiatives that emerged to empower learners apparently faced sustainability issues, which stressed the need for context-sensitive rural education strategies.

Bridging the Digital Education Policy Gap

Several respondents highlighted a disconnect between digital education policy frameworks and their practical implementation, describing policies as "existing only on paper." This disconnect resulted in poorly executed digital initiatives and inadequate resource allocation. Oteyi and Dede (2025) critically examined this gap, revealing that administrative capacities often lag the rapid pace of technological advancement, undermining digital transformation's effectiveness. The lack of stakeholder buy-in further compounds these challenges, impeding digital education's equitable distribution and adoption. Recent studies highlight that effective engagement of stakeholders in educational programs requires strategic approaches focused on knowledge acquisition and competitive advantage alignment (Al-Thani, 2025; Sadovska et al., 2024). Moreover, robust governance and visionary leadership are essential for navigating the complexities of digital integration. Uzorka et al. (2025) argue that educational leaders should be equipped to manage digital inequality, information overload, and pedagogical shifts while nurturing innovation and adaptability. Jing et al. (2025) reinforce this by emphasizing the need for leadership competencies that support strategic planning, policy implementation, and institutional transformation in the digital era. According to Bergsteedt and du Plessis (2025), the obstinate gap between digital education policies and practice reflects institutional theory's emphasis on decoupling. In this theory, formal policies exist without essential execution due to misaligned capacities and interests. Limited stakeholder engagement and weak governance intensify this gap by stressing the necessity of transformational leadership theory. According to Mohamad Rashid and Abdul Wahab (2024), the transformational leadership theory advocates for visionary, adaptive leaders who promote innovation, associate stakeholders, and drive effective digital integration within complexity.

Associating Educator Training and Digital Transformation

The narratives concerning substandard educator training and digital literacy expose a disconnect in the digital transformation of education, i.e., without sustained, context-sensitive professional development, change is unlikely to take root. Respondents consistently highlighted a gap in educators' digital competence that erodes

confidence and constrains the pedagogical use of available technologies. This concern was echoed across recent literature, highlighting that short-term interventions and one-off workshops are insufficient to promote meaningful instructional innovation. Domínguez-González et al. (2025) highlight that digital competence remains low among educators, particularly in secondary education, and that training programs often fail to align with educators' real-world classroom needs. Gallego Joya et al. (2025) argue that effective digital integration demands a multifaceted approach combining technical and pedagogical training, institutional support, and continuous evaluation. Amemasor et al. (2025) support this by demonstrating that transformative professional development should be collaborative, hands-on, and sustained over time to shift educator attitudes and practices meaningfully. These studies highlight that digital reform in education will remain aspirational unless educators are empowered with technical professional skills to navigate the realities of generative AI. These findings underscore a critical theory of change in education technology (Mouza et al., 2022). According to this theory, sustainable digital transformation depends on constant, context-sensitive professional development. Drawing on sociocultural learning theory and situated cognition (Giles et al., 2025), effective digital integration involves technology use within reliable classroom practices. With no incessant collaborative training that aligns with lived experiences, low digital competence educators delay evocative academic innovation and the real-world application of generative AI.

Multilingual Inclusion in Digital Education Strategy

Despite the global surge in digital education, its design remains monolingual and monocultural, an oversight with reflective outcomes in linguistically diverse societies like South Africa. Respondents contend that the dominance of English in digital learning platforms embeds systemic exclusion, marginalizing learners whose identities and epistemologies are rooted in indigenous languages and cultural frameworks. This linguistic and cultural erasure weakens comprehension and isolates learners from the educational process itself. Vann et al. (2025) affirm that when digital content is anchored in local identities, it catalyzes deeper engagement and significantly improves learning outcomes. On the other hand, Emeklioğlu and Bayraktar Balkır (2025) call for a radical reimagined digital education policy that prioritizes localization and linguistic justice as foundational. According to Subandiyah et al. (2025), the findings stress that monolingual digital education perpetuates exclusion, aligning with Rogers' Diffusion of Innovations theory. In this theory, cultural relevance facilitates adoption. Educator agency is vital as educators should facilitate local content to encourage engagement. In rural education development frameworks, embedding indigenous languages promotes inclusivity and empowerment. Kerfoot (2024) echoes the call for policies selecting linguistic justice and localized digital learning.

Dealing with Equity and Ethics in AI Education

Concerns over widening digital divides, inequitable access, and student data privacy surfaced repeatedly, revealing deep systemic vulnerabilities in the integration of generative AI in education. Respondents voiced frustration over the exclusion of marginalized learners and the absence of enforceable policies to safeguard digital rights and privacy. These concerns highlight global anxieties surrounding the ethical deployment of generative AI, which Mukaffan and Siswanto (2025) frame as a critical risk factor for heightening existing educational

inequalities when digital systems are not inclusively designed. The findings highlight a critical need for recalibrating digital education strategies where technological innovations are balanced with principles of social justice and inclusion (Amiri, 2025). Buchanan et al. (2022) and Eynon and Malmberg (2021) argue that educational technologies must serve as equality instruments, not exclusion. Moreover, without intentional design and policy safeguards, generative AI-enhanced education risks entrenching disparities rather than dismantling them. Thus, the ethical architecture of digital education should prioritize the protection of vulnerable populations, ensure equitable access, and uphold the digital rights of all learners in an increasingly digitalized world. The findings align with technology adoption theories emphasizing contextual and equity reflections, highlighting how educator agency and inclusive policy mitigate digital divides in rural education development. Tanksley et al. (2025) warn that without deliberate, justice-centered designs and empowered educators, generative AI risks would reinforce exclusion and not enable equitable learning opportunities.

Implications for Policy and Practice

This study highlights the need for transformative policy frameworks beyond top-down mandates. Policies should institutionalize the co-creation of digital content with active input from local educators and communities to enhance cultural and linguistic relevance. Continuous professional development should be embedded within policy, tailored to the unique challenges of rural education systems. Strategic investment in digital infrastructure supported by public and private partnerships should be prioritized to bridge the urban and rural digital divide. Moreover, robust digital equity policies are essential to guarantee fair access, promote inclusion, and safeguard student data and privacy. Subsidization models for device access and mechanisms for ongoing technical support and maintenance should be considered to ensure long-term sustainability.

Additionally, practitioners must adopt a collaborative and context-aware approach to implementing digital education. Infrastructure deployment should be sensitive to rural schools' logistical and sociocultural realities. Educational institutions and districts should establish and sustain partnerships to facilitate the delivery, maintenance, and renewal of digital devices for educators and learners. Inclusive practices and ethical protocols should guide the distribution of generative AI and digital tools, ensuring they address the needs of marginalized groups while protecting digital rights and privacy. The co-development of digital learning content should be led by local educators and community members, integrating indigenous languages and cultural knowledge to encourage learner engagement and achievement. Finally, ongoing educator training programs could combine digital literacy with curriculum-aligned technology integration and responsive support systems to build pedagogical confidence and competence.

Conclusion

This study identified the multifaceted challenges impeding the equitable and effective integration of generative AI in education, in multilingual and multicultural contexts such as South Africa. The findings revealed systemic gaps in digital literacy among educators, a persistent disconnect between policy and practice, and a critical lack of localized content that resonates with learners' linguistic and cultural identities. These barriers are not merely

operational; they are structural, rooted in governance, leadership, and the undervaluing of sustained professional development of educators. The evidence suggests that digital transformation in education cannot be achieved through fragmented interventions or symbolic policy gestures. Instead, it demands a shift that centres educators as digital change agents in education, embeds cultural relevance into content design, and aligns strategic policy with grassroots implementation. Future research should interrogate the mechanisms of stakeholder buy-in, explore scalable models of educator training, and evaluate the long-term impact of culturally responsive digital pedagogies. Without such reformations, the promise of generative AI in education will remain aspirational rather than transformative.

Recommendations

To overcome the entrenched challenges facing generative AI in education in rural South Africa, a coordinated and sustained effort from all stakeholders, including government bodies, private sector actors, educational institutions, and local communities, is imperative. Strategic collaboration should be underpinned by evidence-informed policymaking and the deployment of technologies sensitive to local contexts. Generative AI-driven educational innovations should be leveraged not to widen existing divides, but to actively close them. This situation requires continuous investment in digital infrastructure, comprehensive and ongoing educator professional development, inclusive and culturally relevant content creation, and the establishment of robust ethical frameworks. These elements should be integrated into a cohesive strategy that prioritizes equity, sustainability, and community empowerment at every stage of digital transformation.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the content of the paper in case of dispute (Ethical review board name: Sefako Makgatho University Research Ethics Committee (SMUREC), Date: 01 December 2024, Reference Number: SMUREC/S/910/2022: IND).

***Statement of Interest*:** We have no conflict of interest to declare.

Data Availability Statement: Data are available on reasonable request from the authors.

Author Contributions: All authors contributed to the study's conception and design. Solly Matshonisa Seeletse was responsible for data collection, formal analysis, and drafting the manuscript. Oratilwe Penwell Mokoena contributed to the methodology, interpretation of results, and critical revision of the manuscript.

***Funding*:** None

***Acknowledgements*:** None

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International Journal of Current Educational Studies

2025, Vol. 4, No. 1, 53-71 ISSN 2822-4914

Embodied or Digital? Navigating the Tensions of Hybrid Teaching Practice Supervision in South African Higher Education

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Article Info

Article Type

Original Research

Article History

Received:
04 September 2025
Accepted:
31 October 2025
Published online:
31 October 2025

Abstract

In South African higher education, student teachers must complete practical school placements under supervision. While supervision is crucial for teacher preparation, few studies explore how supervisors balance face-to-face and online modalities, especially in resource-constrained contexts. This article examines how teaching practice supervision is navigated, focusing on the interplay between physical presence and digital engagement, and the tension between administrative and mentoring responsibilities. An autoethnographic approach was used, drawing on the researcher's experiences across multiple supervision cycles. Data were collected through reflective journals, memory work, and field notes, capturing personal narratives and emotional responses. Three themes emerged: embodied presence fosters relational engagement and supports student teachers' professional growth; digital supervision provides flexibility but is constrained by connectivity and reduced relational depth; and institutional demands create tension with mentoring, shaping supervision quality. Adequate supervision requires a hybrid approach that integrates physical and digital modalities. Universities should prioritize school visits, strengthen digital infrastructure, streamline administrative tasks, and provide professional development in digital pedagogy and reflexive practice. These measures can enhance supervision quality, ensuring student teachers receive robust instructional guidance and meaningful relational support, even in challenging and resource-limited settings.

Keywords: Hybrid learning models, Online modalities, Teacher education, Teaching practice supervision, South African higher education.

Citation:

Yende, S. J. (2025). Embodied or digital? Navigating the tensions of hybrid teaching practice supervision in South African higher education. *International Journal of Current Education Studies (IJCES)*, *4*(2), 53-71. https://doi.org/10.46328/ijces.203

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Introduction

It is prudent to foreground this article with a brief overview of teaching practice in South African higher education to contextualize the researcher's experiences as a supervisor. According to the Department of Education (2007), student teachers must be placed in schools recognized as exemplary teaching and learning environments. These placements complement theoretical preparation with hands-on experience in authentic educational settings. They enable student teachers to observe school functioning, receive feedback on their instructional skills, manage classrooms, participate in staff meetings, and collaborate in educational processes (van Tonder & Fourie, 2018). Teaching practice allows student teachers to develop professional competencies that cannot be fully cultivated in lecture halls or through textbooks alone. Exposure to fundamental classroom dynamics provides opportunities to navigate complex interpersonal, cultural, and administrative aspects of schooling, preparing them for the realities of teaching in diverse educational contexts. Teaching practice is widely acknowledged as a core component of initial teacher education, requiring student teachers to apply theoretical knowledge in authentic classroom contexts (Aglazor, 2017; Kiggundu & Nayimuli, 2009; Mannathoko, 2013; Matoti & Odora, 2013; Moosa, 2019; Phillips & Condy, 2023). Leng (2023, p. 1) asserts that:

> One of the primary purposes of teacher supervision is to enhance the quality of instruction. Supervisors observe teachers in action, providing valuable feedback on teaching techniques, content delivery, and classroom management. This process helps teachers refine their skills and adapt their methods to better meet the needs of their students. Effective teacher supervision often includes mentorship and support.

Supervisors play a pivotal role in ensuring that teaching practice translates theory into effective classroom practice. Their involvement allows student teachers to reflect on pedagogical decisions, adapt methods to meet learners' diverse needs, and develop confidence in their professional identity. Effective feedback, central to supervision, is influenced differently by embodied presence in face-to-face contexts and technological mediation in online environments. Physical presence enables supervisors to observe classroom interactions in real time, noting subtle non-verbal cues, learner engagement, and classroom climate. While offering flexibility and access across geographically dispersed schools, online supervision can limit these observational subtleties and shift the focus toward verbal interactions, digital submissions, and technological problem-solving. These differences are further shaped by institutional expectations, workload pressures, and infrastructural constraints (Mosito et al., 2025; Perry et al., 2021). Understanding these differences is essential for framing the three themes explored in this article: relational dynamics of supervision, integration of technology, and negotiation of institutional demands in dual-modal contexts.

The emergence of Open and Distance e-Learning (ODeL) has added complexity to teaching practice supervision. Unlike traditional face-to-face modalities, ODeL supervision must contend with challenges such as technological inequities, limited access to reliable internet, and disparities in learners' digital literacy (UNESCO & International Task Force on Teachers for Education 2030, 2023; Dionne et al., 2024). At the same time, ODeL presents opportunities that include flexibility, scalability, and the ability to support geographically dispersed student teachers (Zou et al., 2025; Lundberg, 2025). This study situates supervision within an ODeL framework,

examining how dual modalities, physical and online, can operate as complementary rather than antagonistic strategies, a concept referred to here as Hybrid Supervision. Theoretical support for this approach draws on blended supervision frameworks that highlight adaptive, learner-centered, and contextually responsive pedagogical strategies (Akbari, 2025; Wessels & Grünwald, 2023; Dyrstad et al., 2024). Hybrid Supervision recognizes that combining physical observation with digital engagement enhances reflective practice, pedagogical responsiveness, and professional support for student teachers.

Despite the growing literature on teaching practice supervision in South Africa, there remains limited exploration of supervisors' lived experiences traversing dual modalities (Aglazor, 2017; Matoti & Odora, 2013; Steyn & Mentz, 2008; van Tonder & Fourie, 2018). Most studies adopt descriptive or evaluative approaches, neglecting supervisory practice's emotional, relational, and contextual dimensions. This article innovatively adopts an autoethnographic methodology, which positions the researcher as participant and observer, enabling deep engagement with the complexities of supervision. Autoethnography captures personal, professional, and emotional dimensions, allowing the researcher to reflect on tensions, adaptations, and moments of insight in real time, while situating these experiences within broader institutional, socio-cultural, and policy contexts (Younas et al., 2025; Zondo & Adu, 2024). By focusing on the supervisor's narrative, autoethnography illuminates the affective and cognitive labor involved in supporting student teachers across hybrid environments, offering a richer and more nuanced understanding of supervision than conventional methods.

The socio-political context of South African classrooms further shapes the supervision process. Supervisors navigate multilingual and socio-economically diverse settings, balancing the needs of learners, schools, and student teachers. Supervision can therefore be understood as a form of critical social justice practice, where guidance, mentoring, and feedback are deployed to address inequities in learning opportunities and pedagogical support (Jojo, 2023; Maphalala & Ajani, 2023; Mosito et al., 2025; Perry et al., 2021). This aligns with international perspectives emphasizing culturally responsive supervision in diverse educational contexts (Dionne et al., 2024; Younas et al., 2025).

The global relevance of hybrid supervision is also notable. Studies in North America, Europe, and Australia increasingly document the integration of digital supervision strategies, highlighting challenges such as equity gaps, technological infrastructure, and professional development needs (Zou et al., 2025; Wessels & Grünwald, 2023). Comparisons with developing contexts demonstrate that many countries face similar structural and socio-economic challenges, reinforcing the importance of adaptive supervisory strategies sensitive to context (Dyrstad et al., 2024; Lundberg, 2025; Akbari, 2025).

This article addresses these gaps by presenting an autoethnographic account of supervising teaching practice in South African higher education through physical and online modalities. Drawing on the author's role within the University of South Africa's College of Education, the study provides first-hand insights into the tensions, adaptations, and innovations inherent in hybrid supervision. By foregrounding individual experiences within broader policy, technological, and socio-cultural frameworks, the study contributes to a more contextually grounded understanding of teacher supervision. Ultimately, it responds to the need for reflective, culturally

situated research that captures the complexity of preparing teachers for increasingly diverse, multilingual, and resource-constrained classrooms while remaining relevant in global debates on digital and hybrid teacher education.

Conceptual Framework

In South Africa, Open and Distance e-Learning (ODeL) has transformed traditional approaches to teacher education supervision. According to Maphalala and Nkosi (2025), ODeL represents a revolutionary platform for democratising education by providing marginalized learners with flexible, accessible, and inclusive pathways to learning. This perspective is reinforced by Tabe et al. (2025, p. 2) who observe that:

> The integration of technology into Open, Distance and e-Learning (ODeL) in higher education has emerged as a transformative force in South Africa and beyond, where accessibility and inclusivity are critical challenges. As digital platforms offer flexibility and scalability, they promise to bridge the gap between traditional education and diverse learner needs.

Based on this statement, it is evident that ODeL plays a crucial role in reshaping higher education by widening participation and enabling institutions to reach students in geographically dispersed or resource-constrained contexts. Tabe et al. (2025) further note that ODeL can transcend traditional educational paradigms, contributing to a more equitable and inclusive higher education landscape that empowers students to drive meaningful societal change.

While ODeL broadens access and supports geographically dispersed student teachers, it also introduces new complexities that influence the quality and equity of supervision. Key challenges include technological inequities, limited access to stable internet connectivity, and variations in digital literacy among student teachers and mentors. Van Wyk (2021) observes that during the COVID-19 lockdown, ODeL students faced numerous barriers, such as expensive data bundles, expiring passwords, poor connectivity, inconsistent discussion forums, and slow system synchronization. Similarly, Ouma's (2019) study in Uganda revealed that students from rural areas often lacked adequate ICT skills and infrastructure to engage in online learning environments effectively. In Zimbabwe, Tanyanyiwa and Madobi (2021) found that the absence of appropriate technological infrastructure and digital devices impeded the realization of ODeL's potential at the Zimbabwe Open University (ZOU), noting that many students' laptops malfunctioned and their mobile phones were unable to connect to the internet. Comparable challenges have been reported in Eswatini, where most learners reside in rural areas with poor connectivity, limited computer skills, and financial constraints that hinder the successful implementation of ODeL initiatives. Collectively, these factors result in inconsistent communication and uneven feedback quality, particularly within rural or under-resourced contexts, thereby affecting the overall effectiveness of ODeL supervision.

At the same time, ODeL presents significant pedagogical and logistical advantages. It allows for flexible scheduling, reduces travel costs, and enables supervisors to maintain ongoing digital contact beyond the temporal boundaries of physical school visits (Lundberg, 2025; Zou et.al, 2025). Through virtual meetings, recorded lessons, and digital feedback tools, ODeL supervision expands the supervisory reach of universities while

supporting student teachers' autonomy and reflective practice. The challenge, therefore, is not whether ODeL can replace physical supervision, but how it can be leveraged to complement embodied forms of engagement. The nuanced navigation of these challenges and opportunities provides the foundation for hybrid models of supervision.

Hybrid Supervision: Theoretical Framing and Complementarity of Modalities

Hybrid Supervision refers to the intentional integration of physical and digital modalities in the mentoring and evaluating student teachers during teaching practice. Rather than positioning online and face-to-face supervision as opposing practices, hybrid supervision conceptualizes them as complementary dimensions of a unified pedagogical approach. This view aligns with adaptive and learner-centered frameworks in blended learning and networked pedagogy, which advocate for flexibility, contextual responsiveness, and relational engagement (Akbari, 2025; Dyrstad et al., 2024; Wessels & Grünwald, 2023).

Theoretically, hybrid supervision draws on constructivist and sociocultural perspectives, recognizing that learning and, by extension, supervision are both situated and mediated. Physical supervision supports embodied observation, affective connection, and contextual understanding, while digital supervision enables asynchronous reflection, scalability, and ongoing mentorship. The intersection of these modalities creates a "pedagogical middle space" (Pather & Naidoo, 2018) where embodied presence and technological mediation coexist to foster access and relational depth. Thus, hybrid supervision is not merely a logistical adaptation to contemporary realities but a deliberate pedagogical strategy that redefines how supervision can be equitable, relational, and sustainable in ODeL environments.

Method

Research Design

This article adopts an autoethnographic research design, a qualitative approach that situates the researcher's personal experiences as both a site of inquiry and a lens for interpreting broader cultural, institutional, and social phenomena (Ellis et al., 2011). Autoethnography allows researchers to examine how personal experiences intersect with larger social, institutional, and cultural dynamics. This study employs a critical-analytic form of autoethnography, moving beyond purely evocative narratives to include explicit connections to social theory, institutional policies, and data analysis. The analytic dimension enables reflection on lived experiences and their broader implications for teacher supervision practices, particularly in dual-modality contexts where physical and online engagements intersect.

Autoethnographic narratives are rich and detailed accounts of prior experiences, including thoughts, feelings, and observations. They can be produced individually or collaboratively in multiple forms, such as written stories, interviews, and audio-visual recordings (Ellis et al., 2011). These narratives are typically selective and retrospective, centering on events that deviate from routine practice or are particularly significant. They are often supported by supplementary materials such as news articles, blogs, videos, photographs, journal entries, field notes, and recorded conversations, which help to contextualize and triangulate memory-based accounts. Such

experiences are frequently emotionally charged, including periods of crisis, cultural conflict, belief confrontation, or moments of professional insight (Ellis et al., 2011; Sims, 2023). This study focuses on the supervision of teaching practice in South African higher education, specifically examining the dynamics of dual-modality supervision involving both physical and online engagement.

Research Context

The study is in the College of Education at the University of South Africa, a large, open, distance e-learning institution. The Teaching Practice Office is critical in placing student teachers in schools and providing professional support during the Work-Integrated Learning component of their studies. The researcher's responsibilities as a teaching practice supervisor include liaising with mentor teachers, conducting in-person school visits, and engaging in online supervisory activities through digital platforms. The dual-modality supervision context emerged as a response to logistical challenges, technological developments, and institutional policies and was further influenced by the COVID-19 pandemic. Data for this study were drawn from two supervision cycles spanning 2025 (second term and third term), providing a temporal boundary that captures evolving practices and adaptations during significant disruptions to conventional teaching and supervision.

Researcher Positionality

As the primary data collection and analysis instrument, the researcher occupies a dual role as participant and observer. Kennedy and Moore (2021) distinguish between an autoethnographer and an autobiographer, noting that the autoethnographer simultaneously assumes the roles of researcher and participant. In contrast, the autobiographer focuses solely on narrating a life story. This dual positionality facilitates deep insight into supervisory practices but requires conscious reflexivity to address subjectivity, bias, and emotional involvement. Reflexive practice was maintained throughout the study, allowing the researcher to identify assumptions or initial biases and revise perspectives based on reflective analysis. For example, the researcher initially questioned specific institutional procedures for digital supervision but, through reflection, recognized their role in maintaining quality assurance and pedagogical standards. This example demonstrates how reflexivity can challenge and reshape preconceptions in practice.

Data Sources and Collection

Autoethnography relies on personal memory and subjective experience as primary data, with the researcher as the central data source (Adam et al., 2015; Kennedy & Moore, 2021; Tarisayi, 2023). Standard methods include self-observation, reflexive journaling, memory work, artifact analysis, and external data collection to contextualize experiences (Tarisayi, 2023, p. 58).

In this study, the primary data sources include:

1. Reflective journals are maintained throughout supervision to document observations, interactions, challenges, and successes in physical and online contexts.

2. Institutional records and correspondence, including placement documentation, communications with mentor teachers, and digital supervision logs.
3. Memory work reconstructs past supervisory experiences and reflects on them in light of current understanding.
4. Field notes recorded during school visits and online sessions capture descriptive and interpretive interaction aspects.

These sources enable a multi-layered supervision account, integrating immediate observations with retrospective reflection. They also support analytic autoethnography, where personal experiences are systematically connected to theory, policy, and broader educational practices.

Data Analysis

Data analysis followed a narrative thematic approach (Cooper & Lilyea, 2022). The researcher engaged in repeated reading, coding, and writing cycles to identify recurring themes across the data. Narrative thematic analysis allows for flexibility in emphasis, ranging from detailed coding to broader consideration of historical, institutional, and social contexts (Riessman, 2008). In this study, the process was iterative, with writing functioning both as a tool for analysis and as a means of meaning-making. This reflexive analytic practice facilitated connections between the researcher's experiences and broader sociocultural and technological contexts, particularly regarding negotiating physical and digital supervision responsibilities.

Ethical Considerations

In line with autoethnographic principles, this study does not involve data collection from other participants, thereby reducing ethical risks associated with informed consent and confidentiality. As the sole participant, the researcher maintained ethical responsibility through reflexivity, honesty, and academic integrity. Institutional references were carefully selected to avoid misrepresentation, ensuring the narrative remained professional, accurate, and respectful of organizational relationships.

Trustworthiness, Validity, and Reliability

Trustworthiness in embodied or digital? Navigating the tensions of hybrid teaching practice supervision in South African higher education was established through credibility, dependability, confirmability, and transferability. Credibility emerged from prolonged engagement in supervision, reflective journaling, and triangulation of data sources such as institutional records, memory work, and field notes. Dependability was achieved through consistent documentation of supervisory processes, while confirmability was strengthened by reflexive self-examination and alignment with existing literature. Thick, contextual descriptions of teaching practice supervision within the University of South Africa enhanced transferability, allowing insights to be applied to similar open and distance learning contexts.

Results

It is prudent to foreground this section by noting that the following research questions were developed based on my experience to guide this article:

- How does embodied presence influence my effectiveness in physically supervising teaching practice?
- What challenges and benefits arise from technological mediation in online teaching practice supervision?
- How do institutional demands affect my ability to balance administrative duties with relational supervision roles?

Based on the research questions, three key themes emerged from my reflective journals and memory work about supervising teaching practice in South African higher education: Embodied Presence, Technological Mediation, and Navigating Institutional Demands. These themes capture my experience of balancing in-person and online supervision, highlighting the role's physical, technological, and administrative aspects. Each theme is explored through personal narratives and connected to relevant academic literature, providing a deeper understanding of how supervision unfolds within complex institutional and socio-cultural contexts.

Theme 1: Embodied Presence – The Tangibility of Physical Supervision

Perhaps it is important to emphasize that being physically present as a supervisor during teaching practice is essential for both the student teacher and the supervisor. Physical presence creates a profound and immersive experience for student teachers, fostering a deeper connection to the teaching environment. This statement was supported by Kolman (2018), who mentions that supervisors and mentors must have quality time with student teachers during the teaching practice to provide effective and sufficient support to student teachers. One journal entry from August captures the atmosphere of a school visit: *"Stepping through the gates, I felt the dust cling to my shoes and the warm air wrap around me. The sound of children's laughter was my welcome."* In those moments, my role extended beyond evaluation; I became part of the fabric of the school day.

The physical presence allowed me to pick up on nuances that might otherwise be missed: a student's hesitant question, the subtle reassurance of a mentor teacher's glance, the rhythm of the classroom. As I recorded: *"It is not just what you see, it is what you feel in the space that shapes your understanding."* The researcher's lived experiences align with the findings of Kiggundu and Nayimuli (2009), who highlight that the school context is a crucial bridge between theory and practice. Being physically present exposes student teachers to authentic learning environments where pedagogical theory is enacted and tested. Similarly, Hathorn (2020) stresses that adequate supervision is rooted in relational engagement, a connection and trust that can only be nurtured through face-to-face interactions. Physical visits foster these relationships by allowing supervisors to engage directly, observe in real time, and respond to the dynamic nature of teaching and learning. Physical presence in the school provides a rich, multi-sensory understanding of teaching practice, reinforcing the literature's emphasis on the importance of contextual immersion in teacher education. Through this embodied engagement, supervisors can more fully support and guide student teachers on their journey from theory to practice.

Theme 2: Technological Mediation – Seeing through the Screen

The COVID-19 pandemic in South Africa primarily prompted the shift to online teaching practice supervision, which compelled students to learn remotely or online. Jojo, 2023, 77 supported this) who states that before the COVID-19 epidemic, teaching practice monitoring was carried out physically in the schools selected by the students for placement by both external and institution-based internal supervisors. However, during the COVID-19 pandemic, many universities adopted remote teaching and learning, which includes teaching practice supervision (Jojo, 2023; Maphalala & Ajani, 2023).

This transition altered not only my practice but my sense of connection, as in my journal, I wrote: *"My office is now a rectangle of light the school compressed into a screen."* Technology enabled unprecedented reach. *"I could connect with a student in a rural town hundreds of kilometres away in minutes,"* I noted. However, there were limitations: *"The lesson froze mid-sentence; I lost the flow. I could hear the teacher's voice, but the learners' responses were lost to the ether"*. This mirrors Hendricks & Mutongoza's (2023) observation that while online modalities expand access to supervision, they risk diluting in-person interaction's relational depth and immediacy.

This was supported by Zaw and Hlaing (2024), who mention that digital learning platforms offer a valuable tool for expanding educational access in developing countries. They enable students in remote areas to access quality education and provide a means to overcome the limitations imposed by teacher shortages and scarce resources. Similarly, Mabidi (2024) highlights that digital platforms in teacher education can bridge geographical divides but require careful pedagogical adaptation to avoid reducing supervision to mere technical observation. Technological mediation offered flexibility and inclusion but also redefined the very texture of supervision. It revealed that accessibility does not automatically equate to richness of engagement, an insight consistent with research on the trade-offs of remote teacher education.

Theme 3: Navigating Institutional Demands – The Balancing Act

Institutional requirements shaped my daily work as much as my professional instincts and personal commitment to supporting student teachers. Reflecting on a particularly demanding week, I wrote in my journal: *"I am constantly between two worlds, one where I am in the classroom with the student, and another where I am answering emails in my car before the next visit."* This tension between direct engagement and administrative responsibilities was a persistent reality.

Balancing the demands of meeting placement deadlines, submitting timely reports, and adhering to policy frameworks often competed with the relational and developmental aspects of supervision that I deeply valued. I noted: *"The human part of this work, the mentoring, the encouragement, has to find space between the forms and the deadlines. This was not only challenging but also a learning experience."* The pressure to comply with institutional processes sometimes risked reducing supervision to a series of bureaucratic tasks. Yet, it also compelled me to find creative ways to maintain the relational core of my work despite time and resource constraints.

This experience aligns closely with Marais and Meier's (2004) findings that teacher education supervisors in South Africa must consistently negotiate the' dual demands of administrative duties and provide pedagogical and emotional support to student teachers. Their research highlights that supervisors often function within tightly regulated systems, prioritizing quality assurance, sometimes overshadowing developmental needs. Similarly, the *National Policy Framework for Teacher Education and Development* (2007) institutionalizes this duality by embedding supervision within both regulatory and formative roles, ensuring accountability while aiming to foster professional growth.

Navigating these competing demands required adaptability, creativity, and resilience. I had to develop strategies to integrate administrative tasks with moments of genuine mentorship, often improvising to carve out time for meaningful engagement. These qualities are echoed in the literature, where scholars emphasize the importance of resilience and flexibility for supervisors working in resource-constrained and policy-driven environments (Hathorn, 2020; Hendricks & Mutongoza, 2023; Jojo, 2023). The complex interplay between institutional demands and personal professional values shaped my supervisory practice profoundly. It underscored that adequate supervision in South African higher education involves pedagogical expertise and managing systemic constraints with empathy and strategic agency.

Perhaps, it is prudent to mention that Table 1 illustrates how the three key themes relate to the research questions and highlights the balance of benefits and challenges inherent in hybrid supervision. It offers a concise visual summary of the lived experiences captured through reflective journals, memory work, and field notes. This multi-layered representation emphasizes the interplay between physical, technological, and institutional factors in shaping supervision practice.

Table 1. Summary of Themes, Research Questions, Benefits, and Challenges with References

Theme	Research Question	Benefits (References)	Challenges (References)
Embodied Presence	How does embodied presence influence physical supervision?	Immersive classroom experience (Kolman, 2018), real-time observation (Kiggundu & Nayimuli, 2009), relational engagement (Hathorn, 2020; Steyn & Mentz, 2008)	Time and travel constraints, limited reach across dispersed schools
Technological Mediation	What challenges and benefits arise from online supervision?	Flexibility, access to remote students (Jojo, 2023; Maphalala & Ajani, 2023; Zaw & Hlaing, 2024), scalability (Zou et al., 2025)	Digital divide (Hendricks & Mutongoza, 2023; UNESCO, 2023), reduced relational depth (Hendricks & Mutongoza, 2023), dependence on digital skills (Ouma, 2019; Tanyanyiwa & Madobi, 2021)

Navigating Institutional Demands	How do institutional demands affect balancing administrative and relational roles?	Accountability and quality assurance (Department of Education, 2007; Marais & Meier, 2004), structured reporting (Mosito et al., 2025; Perry et al., 2021)	Risk of bureaucratic supervision, tension with mentorship (Hathorn, 2020; Jojo, 2023)

Source: Researcher

Synthesis of Themes

The narratives drawn from my autoethnographic reflections reveal a nuanced understanding of teaching practice supervision in South African higher education, far from existing as mutually exclusive or competing modalities, physical and online supervision emerge as complementary tools, each offering distinct affordances while presenting unique constraints. This synthesis underscores the evolving nature of supervision, where the future lies not in choosing between physical presence and digital interaction, but in embracing a hybrid approach that thoughtfully combines both strengths.

A journal entry encapsulating this emerging perspective states, *"The future of supervision is not in choosing one or the other, it is in learning how to dance between the two."* This metaphor vividly conveys the dynamic balancing act supervisors must perform as they negotiate the demands of in-person engagement alongside the practicalities and innovations enabled by technology. Such a dual modality reflects the realities of contemporary South African higher education, where geographic dispersion, resource limitations, and the push towards digitalization coexist. Physical supervision offers rich, embodied experiences that foster deep relational connections and contextual understanding. Being physically present in schools allows supervisors to capture subtle non-verbal cues, classroom atmosphere, and school culture dimensions crucial for mentoring and authentic assessment (Kiggundu & Nayimuli, 2009; Hudson, 2013). These embodied encounters ground supervision in tangible realities, enabling supervisors to respond holistically to the student teacher's developmental needs. However, physical visits are often constrained by logistical challenges such as distance, time, and funding, which can limit the frequency and reach of such interactions.

Conversely, online supervision expands accessibility, offering flexible and immediate channels for communication and support, especially for student teachers in remote or underserved areas (Jojo, 2023; Hendricks & Mutongoza, 2023). Digital platforms facilitate ongoing engagement beyond formal visits, allowing supervisors to provide timely feedback and maintain contact despite spatial barriers. However, online modalities risk reducing supervision to transactional exchanges and may lack the sensory and emotional richness that face-to-face interactions afford (Quinco-Cadosales et al., 2024). Technological challenges, such as poor connectivity or limited digital literacy, further complicate this modality, highlighting the digital divide within South Africa's education system (Mabidi, 2024; Zaw & Hlaing, 2024). The synthesis of these themes suggests that hybrid models integrating physical and online supervision can effectively harness the complementary strengths of both modalities while mitigating their limitations. Pather and Naidoo (2018) argue that when thoughtfully designed and implemented, hybrid models create flexible, inclusive, and contextually responsive supervision systems

capable of addressing diverse student needs. Such models encourage supervisors to be adaptive, employing digital tools to maintain continuity of support while preserving opportunities for embodied engagement whenever possible.

Furthermore, the interplay between institutional demands and supervisory practice reinforces the need for hybrid approaches. The administrative and policy frameworks governing teaching practice supervision require efficient monitoring and reporting, which digital platforms can facilitate. At the same time, the developmental and relational aspects of supervision demand the kind of presence and engagement that physical visits nurture (Marais & Meier, 2004; Department of Education, 2007). Hybrid supervision offers a pragmatic solution, allowing supervisors to fulfill regulatory responsibilities digitally while prioritizing in-person interactions for mentorship and formative support. This synthesis foregrounds the evolving role of the teaching practice supervisor as one who must skillfully navigate between physical and virtual spaces. Embracing hybridity reflects current technological and institutional realities and enhances the quality and reach of supervision. The challenge lies in developing integrated systems that leverage technology without compromising the relational core of teaching practice supervision. This balance is crucial for preparing competent, confident, and reflective educators in South Africa's diverse higher education landscape.

Discussion

This article has argued that teaching practice supervision in South African higher education involves a complex interplay between physical presence, technological mediation, and institutional demands. Adequate supervision requires pedagogical expertise and adherence to institutional policy and deliberate relational engagement, reflexivity, and adaptive strategies to navigate systemic constraints. Hybrid supervision, which integrates physical and digital modalities, emerges as both a practical necessity and a pedagogical opportunity in this context.

The findings indicate that physical supervision provides an immersive and meaningful experience for the student teacher and the supervisor. Consistent with Kolman (2018), who emphasizes the importance of supervisors spending quality time with student teachers, my reflections show that being physically present enables supervisors to capture nuanced classroom dynamics, such as non-verbal cues, teacher-learner interactions, and classroom rhythms. A reflexive insight occurred when I initially prioritized lesson observation over relational engagement. Reflective journaling revealed that attending to relational and emotional dynamics is crucial for student development. These observations align with Kiggundu and Nayimuli (2009), who highlight the importance of the school context in bridging theory and practice. Hathorn (2020) similarly underscores that trust and relational connection, central to adequate supervision, are nurtured through sustained face-to-face interactions. Steyn and Mentz (2008) support the idea that integrated models of teacher training, combining practical immersion with reflective engagement, strengthen pedagogical competence.

Technological mediation offers flexibility, access, and inclusivity, particularly in contexts characterized by distance, resource limitations, and high student enrolments (Jojo, 2023; Maphalala & Ajani, 2023). However, the South African digital divide, including poor connectivity, limited access to devices, and high data costs, creates

systemic constraints that shape online supervision's ethical and practical application. My reflections capture these limitations: “The lesson froze mid-sentence; I could hear the teacher’s voice, but learners’ responses were lost to the ether.” Hendricks and Mutongoza (2023) note that online supervision can dilute relational depth, particularly in under-resourced rural contexts. Zaw and Hlaing (2024) and Quinco-Cadosales et al. (2024) emphasize that digital platforms can bridge geographic and resource gaps but require careful pedagogical adaptation to maintain meaningful engagement. Recent research indicates that hybrid supervision can optimize both flexibility and relational depth if supervisors intentionally design interactions to account for socio-economic and technological disparities (Akbari, 2025; Dyrstad et al., 2024; Lundberg, 2025; Younas, El-Dakhs, & Jiang, 2025; Zou et al., 2025).

Institutional demands also significantly shape the supervisor’s role, often creating tension between administrative obligations and supervision's relational and developmental aspects. This aligns with the Department of Education (2007) framework, which highlights the dual mandate of supervisors in South Africa to ensure quality assurance while fostering professional development. A reflexive moment occurred when I initially regarded strict reporting requirements as bureaucratic obstacles; further reflection revealed that these processes ensure fairness, accountability, and quality. This demonstrates that administrative compliance can enhance, rather than detract from, relational supervision.

The findings suggest that adequate supervision in South Africa requires complementary integration of physical and digital modalities. Steyn and Mentz (2008) advocate for models that combine practical immersion with reflective engagement, while Perry et al. (2021) emphasize that blended approaches enhance scalability, equity, and flexibility. Reflexive, creative, and persistent qualities are crucial for supervisors negotiating these challenges, a point reinforced by Ellis et al. (2011) and Cooper and Lilyea (2022), who highlight the value of autoethnography in capturing the emotional, relational, and practical dimensions of professional practice. The autoethnographic perspective provides unique insight into how supervisors navigate competing institutional, technological, and relational demands, offering a lens to challenge assumptions that online supervision is inherently inferior to face-to-face supervision.

This study situates supervision within South Africa’s socio-linguistically diverse and socio-economically unequal classrooms, aligning with UNESCO and the International Task Force on Teachers for Education 2030 (2023), which advocate for contextually responsive teacher support. By foregrounding lived experience, the study demonstrates that hybrid supervision requires ethical and pedagogical consideration of digital inequities while maintaining relational depth, flexibility, and resilience. The findings support the concept of hybrid supervision as a model that leverages embodied presence and digital innovation to balance accessibility with meaningful engagement (Dionne, Gagnon, & Petit, 2024; Mabidi, 2024; Mosito et al., 2025; Leng, 2023; Zondo & Adu, 2024).

In conclusion, adequate teaching practice supervision in South African higher education is a dynamic, contextually situated process that requires integrating physical presence, technological mediation, and institutional compliance. Reflexive, adaptive, and resilient supervisors are essential for bridging theory and practice, nurturing student

teacher growth, and negotiating systemic constraints. Hybrid supervision models that leverage embodied and digital modalities, while remaining attentive to equity and accessibility, provide a practical and theoretically informed framework. These findings contribute to the discourse on teacher education by offering an autoethnographic perspective that captures supervision's complex, lived realities, informs policy, and offers guidance for practice in both developing and developed contexts.

Conclusion

This article has provided an autoethnographic exploration of the evolving practice of supervising teaching practice in South African higher education, revealing complex interactions between physical presence, digital mediation, and institutional structures. Beyond recounting the lived realities of supervision, this study invites a more profound reconsideration of how supervision is conceptualized and enacted in contemporary educational contexts marked by rapid technological change and systemic challenges.

A key new insight emerging from this study is recognizing that supervision is fundamentally a relational and adaptive practice transcending modality. Adequate supervision hinges on the supervisor's capacity to create spaces of trust, dialogue, and professional growth, whether through physical visits or online engagements. This underscores supervision as a dynamic process of co-construction, rather than a unilateral act of assessment or oversight. The fluidity and responsiveness required of supervisors mirror broader shifts in higher education towards learner-centered, flexible pedagogies that accommodate diverse student realities and evolving professional identities. Another critical insight relates to the role of technological tools not simply as replacements or supplements to face-to-face supervision, but as active agents that reshape the supervisory relationship and pedagogical possibilities. Technology introduces new visibility, interaction, and record-keeping forms, raising questions about presence, authenticity, and equity. This article highlights the importance of critically engaging with technology beyond instrumentalist perspectives, recognizing its capacity to enable and constrain meaningful educational encounters. Such reflexivity invites supervisors and institutions to thoughtfully design hybrid models responsive to logistical needs and the socio-emotional and cultural dimensions of teaching and learning.

While often perceived as obstacles, institutional demands offer a framework for reimagining supervision as a site of innovation and professional agency. Rather than viewing administrative tasks and policy compliance as competing with relational mentorship, this study suggests they can be integrated into a holistic supervisory practice that values accountability alongside developmental support. This calls for institutional environments that foster collaboration, provide professional development tailored to hybrid supervisory skills, and create flexible policies to accommodate diverse supervisory contexts and modalities. Furthermore, this article points to the transformative potential of autoethnographic inquiry in professional practice research. Therefore, by centering the researcher's voice and reflexivity, autoethnography illuminates the emotional and contextual complexities that often remain hidden in traditional research approaches. This methodology enriches understanding and models a form of supervision grounded in critical self-awareness and continuous learning, essential for navigating the ambiguities and tensions inherent in teacher education today.

Lastly, the findings encourage a shift in how success in teaching practice supervision is defined and measured. Beyond standardized checklists and formal evaluations, success should encompass the cultivation of professional identities, resilience, and reflective capacities among student teachers. Supervisors are learners in this process, developing new competencies and perspectives as they negotiate physical and digital spaces, institutional expectations, and relational dynamics. Recognizing supervision as an evolving, co-creative journey can lead to more humane, effective, and contextually meaningful teacher education. This article contributes to ongoing debates by reframing teaching practice supervision not merely as a procedural obligation but as a nuanced, relational, and adaptive educational practice. It advocates for hybrid supervisory models informed by critical engagement with technology and institutional realities, and grounded in reflective, autoethnographic insight. As South African higher education continues to transform, embracing these perspectives can help build supervision systems that are resilient, inclusive, and capable of nurturing the next generation of educators in all their complexity.

Recommendations

Based on the findings of this study, teaching practice supervision in higher education requires a careful balance between physical engagement, technological support, and institutional demands. Universities should prioritize regular physical school visits, allowing supervisors to engage directly with student teachers, observe classroom dynamics, and provide meaningful relational support. Being present in the classroom enables supervisors to capture subtle interactions, non-verbal cues, and the overall learning environment, all of which are critical for fostering professional growth and bridging the gap between theory and practice.

At the same time, the use of digital platforms should be enhanced to complement physical supervision. Online supervision can increase accessibility and flexibility, particularly for students in remote areas, but it must be carefully integrated to maintain meaningful engagement. Institutions should invest in reliable digital infrastructure and ensure supervisors have the skills to use technology effectively. Hybrid supervision models that strategically blend in-person and online modalities can provide the best of both approaches, enabling supervisors to adapt to varying contexts while sustaining rich pedagogical interactions.

Administrative responsibilities should be managed to allow supervisors to focus on mentoring and pedagogical support. Streamlining reporting requirements and creating dedicated time for engagement can help reduce the tension between compliance and relational aspects of supervision. Supporting supervisors through professional development in digital pedagogy, adaptive management, and reflective practice can strengthen their ability to navigate complex institutional and socio-cultural environments.

From a policy perspective, universities should develop frameworks that recognize hybrid supervision as a legitimate and practical approach, ensuring that quality assurance measures do not overshadow developmental goals. Future research could explore the long-term impact of hybrid supervision on student outcomes, professional identity, and teaching efficacy, and examine how supervisors across different contexts manage the interplay between physical, digital, and institutional demands. These recommendations aim to promote a holistic,

responsive, and contextually aware approach to teaching practice supervision.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** Although this article is an autoethnographic study based solely on the researcher's personal experiences and therefore did not require formal ethical clearance, all relevant ethical guidelines and standards were strictly observed throughout the research and writing.

***Statement of Interest*:** I hereby declare no conflict of interest to declare.

Data Availability Statement: Data is available at a reasonable request from the author.

Author Contributions: The author conceived and designed the study, carried out data collection, conducted the formal analysis, and prepared the initial draft of the manuscript. The author also developed the methodology, interpreted the results, and critically revised the manuscript. In addition, the author supervised the overall research process and ensured feedback and reflection throughout all stages of the study. The author read and approved the final version of the manuscript.

***Funding*:** None

***Acknowledgments*:** None

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International Journal of Current Educational Studies

2025, Vol. 4, No. 2, 72-88 ISSN 2822-4914

An Investigation of Pre-service Teachers' Curriculum Expertise in Terms of Pedagogical Knowledge and Educational Beliefs

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Article Info

Article Type

Original Research

Article History

Received:
10 September 2025
Accepted:
25 December 2025
Published online:
26 December 2025

Abstract

This study examined the associations between pre-service teachers' pedagogical knowledge and skills and their educational beliefs within the framework of curriculum expertise. Using a quantitative approach with descriptive and correlational survey models, researchers collected data from 403 pre-service teachers who volunteered through the Educational Beliefs Scale and the Pedagogical Knowledge and Skills Scale. The results were analyzed using Spearman's rho and Kruskal–Wallis H tests. Participants predominantly identified with Existentialist (56.6%) and Progressivist (22.6%) educational beliefs, while Essentialist beliefs were least represented (3.2%). Significant positive correlations ($r = .41–.54$, $p < .001$) were found between pedagogical competencies and Progressivism, Existentialism, Reconstructionism, and Perennialism. Conversely, no significant relationship emerged between Essentialist beliefs and pedagogical competencies. Reconstructionists exhibited the highest scores in pedagogical knowledge and skills, while Essentialists scored the lowest. The findings suggest that contemporary, student-centered beliefs foster curriculum expertise more effectively than traditional orientations. A notable gap remains in curriculum implementation research regarding the interaction between philosophical orientations and pedagogical skills. The study recommends that teacher education programs incorporate reflective activities to align candidates' beliefs with contemporary pedagogical requirements, thereby enhancing their curriculum expertise.

Keywords: Curriculum expertise, Pedagogical knowledge, Educational beliefs, Pre-service teachers.

Citation:

Balcı, Ö., & Yumuşak, G. (2026). An investigation of pre-service teachers' curriculum expertise in terms of pedagogical knowledge and educational beliefs. *International Journal of Current Education Studies (IJCES)*, *4*(2), 72-88. https://doi.org/10.46328/ijces.206

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Introduction

The achievement of educational objectives is realized through a specific curriculum and the mediation of teachers, who serve as the primary practitioners of this program. In this context, it is of paramount importance that teachers possess sufficient pedagogical knowledge regarding the requirements of the curriculum and the procedures for its implementation. As Gökçek and Yılmaz (2019) state, pedagogical knowledge and skills relate to instructional techniques and strategies that facilitate learning, encouraging teachers to assume the roles of learning facilitators, coaches, models, evaluators, managers, and advocates. As highlighted by Tunca et al. (2015), the educational beliefs held by teachers constitute a fundamental determinant in their effective implementation of curriculum, fulfillment of professional roles and responsibilities, and exhibition of classroom behaviors that foster learning and thinking. In this respect, it is essential that teachers' educational beliefs act as a supportive mechanism in the process of putting curriculum into practice.

Educational beliefs occupy a central role in understanding the teaching-learning process and, particularly within the context of teacher education, encompass implicit and often unquestioned intellectual dispositions that influence how pre-service teachers learn to teach and make sense of this process (Fives & Buehl, 2008). For this reason, beliefs are regarded as personal cognitive structures that provide the foundation for teachers to interpret, evaluate, and formulate judgments regarding their own practices (Santos & Miguel, 2019). The fact that teachers simultaneously hold beliefs across numerous domains highlights the multidimensional nature of this construct. Indeed, teachers maintain an expansive belief system ranging from epistemological beliefs concerning the nature of knowledge to student-related beliefs regarding motivation, achievement, anxiety, cultural characteristics, and abilities; from self-oriented beliefs such as self-efficacy, self-worth, and self-concept to instructional beliefs regarding the content to be taught and pedagogical methods; and even extending to attitudes and beliefs toward social, ethical, and political issues affecting instruction (Levin, 2014). This multi-layered structure demonstrates that teachers' educational beliefs are significant determinants of pedagogical decisions and classroom behaviors. These beliefs often organize into distinct profiles that characterize a teacher’s overall approach.

Recent research on the interaction between curriculum knowledge and pre-service teachers' belief systems emphasizes the role of these elements in teacher education. For instance, an action research study conducted by Kerimoğlu and Altun (2024) demonstrated that the Backward Design approach significantly enhanced preschool pre-service teachers' curriculum knowledge. Similarly, Şahin and Aşkın Tekkol (2023) reported that primary school pre-service teachers exhibited high levels of curriculum literacy and achieved success in curriculum knowledge assessments. Likewise, Avcı and Kutluca (2022) found that preschool pre-service teachers held child-centered pedagogical beliefs and demonstrated high levels of pedagogical content knowledge, with these variables moderately predicting the quality of instructional practices. In a study analyzing science pre-service teachers' reflective journals, Dragnić-Cindrić and Anderson (2024) identified that candidates developed themes related to pedagogical content knowledge dimensions such as science teaching approaches and science curriculum knowledge; however, knowledge regarding the assessment dimension received less emphasis. Furthermore, examining the relationship between knowledge and beliefs, Yang et al. (2020) found that Chinese pre-service mathematics teachers' beliefs showed a stronger association with their self-reported inquiry-oriented instructional

practice than did their mathematical content knowledge and pedagogical content knowledge, with beliefs acting as mediators between knowledge and instructional practice. Similarly, Xiong et al. (2022) revealed that pre-service teachers' epistemic beliefs significantly influenced their perceptions of technological pedagogical content knowledge, with positivist and partial constructivist clusters demonstrating stronger TPACK perceptions than constructivist pre-service teachers. Moreover, Nousheen et al. (2024) demonstrated significant differences in pre-service teachers' self-efficacy, perceived content knowledge, and pedagogical knowledge following a teaching practicum, highlighting the dynamic nature of these constructs during teacher preparation. Finally, Poulton (2025) highlighted in an Australian study that pre-service teachers perceived curriculum not merely as "content to be delivered" but as an actively shaped process; nevertheless, existing field experiences predominantly remained characterized by passive acceptance of curriculum. These findings indicate that pedagogical knowledge and beliefs play a critical role in developing pre-service teachers' curriculum competence.

Teachers' educational beliefs directly shape their classroom practices and the way they implement the curriculum. It can be argued that the attitudes and behaviors teachers exhibit, the roles they assume, their responsibilities, and their teaching competencies are largely forged in line with their educational beliefs. This is because teachers' educational beliefs are determined and guided by the educational philosophy they adopt (Tuncer & Yılmaz, 2024). Accordingly, the study by Berkant and Özaslan (2019) revealed that Progressivism scores were significantly higher among those adopting a student-centered approach, whereas Essentialism scores were higher among those favoring a teacher-centered approach. Furthermore, both types of beliefs were found to differ in favor of those who deem subject-oriented instruction appropriate. Similarly, the study by Baş and Şentürk (2019) indicates that teachers' educational beliefs are a primary factor determining curricular orientations. While teachers with traditional beliefs tend to adopt a subject-centered approach, those with contemporary beliefs exhibit orientations that place the student and the problem at the center. There are also studies indicating that educational beliefs affect instructional environments not only at the level of pedagogical preferences but also in broader dimensions such as democratic attitudes. For instance, Sönmez Ektem (2019) demonstrated that as pre-service teachers' existentialist educational philosophy beliefs increase, their democratic attitudes rise; conversely, as essentialist beliefs strengthen, democratic attitude scores decrease. These results show that educational beliefs are a critical variable determining the democratic quality of learning environments beyond classroom practices. In this context, the work of Oğuz et al. (2014) points to another facet of how educational beliefs format instructional settings, showing significant relationships between teachers' educational beliefs and behaviors that support learner autonomy.

Teachers' established beliefs regarding the concepts of learning, teaching, and studentship directly format their classroom decisions and pedagogical approaches. Therefore, it is insufficient for planned educational innovations to be carried out only at the level of the curriculum, instructional materials, or assessment systems. According to Pajares (1992), a large portion of educational research measures teacher behavior but often overlooks the cognitive foundations—specifically belief systems—underlying these behaviors. However, it is belief rather than knowledge that guides teacher behavior; knowledge becomes operational in ways sanctioned by the belief system. In this respect, educational reform efforts cannot be permanent unless a transformation occurs at the level of beliefs. Pajares (1992) emphasizes that contemporary approaches such as student-centered learning are possible

not merely through the renewal of instructional materials, but through a shift in teachers' beliefs regarding the nature of learning. Consequently, identifying the educational beliefs of teachers and pre-service teachers is of great importance for understanding and explaining their behaviors (Yılmaz et al., 2011; Yılmaz & Tosun, 2013).

Building upon this interaction between belief and behavior, teacher competence is best understood as a multidimensional concept encompassing subject matter knowledge, pedagogical content knowledge, and general pedagogical knowledge, as well as skills in perception, interpretation, and decision-making (König et al., 2015). To fully comprehend the nature of this competence, it is essential to examine the interplay between knowledge and belief. Although Pajares (1992) identifies these as distinct yet mutually influencing constructs, Ennis (1994) provides a critical distinction: he defines knowledge as factual structures grounded in the consensus of experts within a discipline, while characterizing beliefs as personal and experiential elements that dictate how specific knowledge is utilized.

Ennis (1994) argues that while pre-service teacher preparation often prioritizes declarative (what) and procedural (how) knowledge, beliefs—functioning as conditional knowledge—are equally vital for the acquisition, organization, and application of knowledge within the instructional process. Unifying these elements, Ennis (1994) proposes the concept of "curriculum expertise," which he defines as "the ability to select and transmit content appropriate for the learner within a specific contextual setting and situation" (p. 164). According to Ennis (1994), this expertise does not stem from knowledge alone but emerges from the synthesis of educational beliefs and pedagogical knowledge. Ultimately, this blending fosters a commitment to student learning and guides critical curricular decisions regarding content selection, instruction, and assessment.

This theoretical framework of curriculum expertise gains particular relevance in dynamic educational contexts. With the frequent renewal of curriculum in Türkiye, which increasingly prioritize student-centered frameworks, teachers continuously encounter new pedagogical approaches and practices. While the frequency and scope of curriculum renewals are separate subjects of investigation, it is anticipated that misalignments between teachers' established educational beliefs and the constructivist nature of these programs may influence the implementation process. In this context, determining teachers' levels of curriculum expertise will facilitate an understanding of their reactions to renewed curriculum and implementation processes.

Given this theoretical and contextual background, the aim of this study is to examine the relationship between the pedagogical knowledge and skill levels of pre-service teachers and their educational beliefs, to reveal variations in pedagogical knowledge and skills based on different educational belief profiles, and to evaluate these two constructs within the framework of curriculum expertise.

To this end, the study sought to answer the following research questions:

1. What are the profiles of pre-service teachers' dominant educational beliefs and their levels of pedagogical knowledge and skills?
2. Is there a significant relationship between pre-service teachers' educational belief scores and their pedagogical knowledge and skill scores?

3. Do pre-service teachers' pedagogical knowledge and skill levels differ significantly according to their dominant educational belief groups?

Method

Research Design

This study was designed using a descriptive and correlational survey model within the framework of a quantitative research approach to examine the relationships between pre-service teachers' pedagogical knowledge and skill levels and their educational beliefs. The research model aims to reveal the current state and examine the students' curriculum expertise by statistically testing the relationships between educational beliefs and pedagogical knowledge and skill scores.

Participants and Procedure

The study group consisted of 403 pre-service teachers enrolled at the Faculty of Education of a state university in Turkey. Participants were recruited using convenience sampling, which was selected due to accessibility and the exploratory nature of the study. The primary inclusion criterion was active enrollment in an undergraduate teacher education program, ensuring that all participants were undergoing formal pedagogical training.

The sample demonstrated diversity across several demographic and academic characteristics. In terms of gender distribution, 56.1% of the participants were female (n = 226) and 43.9% were male (n = 177). The age of participants ranged from 18 to 31 years, with a mean age of 19.85 years (SD = 2.93). Regarding academic standing, the distribution across year levels was as follows: second-year students comprised 47.4% (n = 191), third-year students 19.9% (n = 80), and fourth-year students 32.8% (n = 132), indicating a higher concentration of second and fourth-year students who possessed more extensive pedagogical coursework and field experience.

Participants represented multiple teacher education programs within the faculty. The distribution by program was: Elementary Education 28.5% (n = 115), Early Childhood Education 19.6% (n = 79), Science Education 14.4% (n = 58), Social Studies Education 12.2% (n = 49), Mathematics Education 10.9% (n = 44), Turkish Language Education 8.7% (n = 35), and English Language Education 5.7% (n = 23). This diverse program representation enhanced the breadth of pedagogical perspectives captured in the study.

A substantial proportion of participants (92%, n = 371) had completed at least one course in educational philosophy or curriculum development, providing them with foundational knowledge of educational belief systems and curriculum theory. This background was considered essential for meaningful engagement with the research instruments, particularly the Educational Beliefs Scale.

Data were collected by the researchers during regularly scheduled course hours. Prior to data collection, participants were provided with detailed information about the study's purpose, procedures, and their rights as research participants. Informed consent forms were distributed, and participation was entirely voluntary. All

participants who agreed to participate signed consent forms, confirming their understanding that participation could be withdrawn at any time without consequence. No personal identification information was requested or collected to ensure anonymity. Participants then completed the Educational Beliefs Scale and the Pedagogical Knowledge and Skills Scale, respectively, in a single session. The entire data collection process was conducted in accordance with ethical principles and institutional review board guidelines. The distribution of pre-service teachers' dominant educational beliefs is presented in Table 1.

Data Collection Instruments

Educational Beliefs Scale

The Educational Beliefs Scale, developed by Yılmaz et al. (2011), was used to determine the pre-service teachers' beliefs regarding educational philosophies. The scale consists of 40 items rated on a 5-point Likert type and comprises five sub-dimensions: Progressivism, Existentialism, Reconstructionism, Perennialism, and Essentialism. In the original development study, construct validity was demonstrated through exploratory and confirmatory factor analyses; it was reported that factor loadings ranged from .42 to .74, and Cronbach's alpha coefficients for the sub-dimensions ranged from .70 to .91. The scale does not yield a total score. A high score obtained from a sub-scale indicates that the participant adopts and believes in the educational philosophy represented by that sub-scale, whereas a low score indicates a low level of belief in the respective philosophy. In this study, sub-dimension scores were calculated by dividing the sum of the relevant items by the number of items, and these mean scores, ranging from 1 to 5, were used in the analysis. In the current study, the internal consistency of the Educational Beliefs Scale was examined using Cronbach's alpha coefficients. The analysis yielded reliability coefficients of .88 for Progressivism, .89 for Existentialism, .84 for Reconstructionism, .78 for Perennialism, and .82 for Essentialism. The overall Cronbach's alpha coefficient was calculated as .93, indicating excellent internal consistency. Since all sub-dimension coefficients exceeded the commonly accepted threshold of .70, the scale was deemed reliable for the present sample.

Pedagogical Knowledge and Skills Scale

To evaluate pre-service teachers' pedagogical knowledge and skill levels regarding instructional processes, the Pedagogical Knowledge and Skills Scale was applied. Developed by Wong et al. (2012) and adapted into Turkish with validity and reliability studies conducted by Gökçek and Yılmaz (2019), the scale consists of 37 items across six sub-dimensions: student learning, lesson planning, instructional support, accommodating diversity, classroom management, and care and concern. The items are rated on a 5-point Likert-type scale. The possible scores obtainable from the scale range from a minimum of 37 to a maximum of 185. The factor loadings of the items in the scale range between .39 and .81. The Cronbach's Alpha coefficient was found to be .94 for the overall scale, while the reliability values for the sub-dimensions ranged from .70 to .88. In this study, mean scores were calculated for each sub-dimension, and the total score derived from all items represented the pre-service teachers' general pedagogical knowledge and skill level. For the current study, the internal consistency of the Pedagogical Knowledge and Skills Scale was assessed using Cronbach's alpha coefficients. The reliability values were

calculated as .90 for Student Learning, .92 for Lesson Planning, .89 for Instructional Support, .93 for Accommodating Diversity, .83 for Classroom Management, and .86 for Care and Concern. The scale demonstrated excellent internal consistency with an overall Cronbach's alpha of .94. These results indicate that the scale and its sub-dimensions yielded highly reliable scores for assessing the pre-service teachers in this sample.

Data Analysis

Data analysis was performed using IBM SPSS Statistics 28.0. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were calculated for continuous variables. The distribution characteristics of the data were evaluated via Shapiro–Wilk and Kolmogorov–Smirnov tests, along with skewness and kurtosis coefficients; it was determined that the normality assumption was not met. Consequently, non-parametric statistical methods were employed. Spearman's rho correlation coefficient was calculated to determine the relationships between educational beliefs and total/sub-dimension scores of pedagogical knowledge and skills, with 95% confidence intervals provided for each correlation. The Kruskal–Wallis H test was utilized to determine whether pedagogical knowledge and skill scores significantly differed by dominant educational belief groups; in cases of significant differences, post-hoc analyses were conducted using Bonferroni-corrected multiple comparisons. Effect sizes for correlation analyses were interpreted according to Cohen's (1988) criteria (.10 small, .30 medium, .50 large). The eta-squared ($\eta 2$) effect size for the Kruskal–Wallis test was interpreted based on Tomczak and Tomczak's (2014) thresholds (.01 small, .06 medium, .14 large). The significance level for all analyses was set at $p < .05$.

Results

Upon examining the dominant educational beliefs of the participants, it was observed that 56.6% held existentialist beliefs, followed by Progressivism at 22.6%, Reconstructionism at 11.4%, Perennialism at 6.2%, and Essentialism at 3.2%. These distributions regarding the participants' dominant educational orientations are detailed in Table 1.

Table 1. Frequency and Percentage Distribution of Participants by Educational Beliefs

Educational Belief	n	%
Progressivism	91	22.6%
Existentialism	228	56.6%
Reconstructionism	46	11.4%
Perennialism	25	6.2%
Essentialism	13	3.2%
Total	403	100%

The Spearman's rho correlation coefficients between the participants' educational belief scores and their total and sub-dimension scores for pedagogical knowledge and skills, along with the lower and upper limits of the 95% confidence intervals, are presented in Table 2.

Significant positive correlations were found between the participants' Progressivism educational belief scores and

their total pedagogical knowledge and skills scores (r = .54, p < .001, ES = Large). Similarly, Progressivism scores were positively correlated with student learning (r = .52, p < .001, ES = Large), lesson planning (r = .55, p < .001, ES = Large), instructional support (r = .45, p < 0.001, ES = Medium), accommodating diversity (r = .46, p < .001, ES = Medium), classroom management (r = .47, p < .001, ES = Medium), and care and concern scores (r = .42, p < .001, ES = Medium).

Furthermore, Existentialism educational belief scores showed significant positive correlations with total pedagogical knowledge and skills scores (r = .48, p < .001, ES = Medium). Existentialism scores were also positively associated with student learning (r = 0.45, p < .001, ES = Medium), lesson planning (r = .48, p < .001, ES = Medium), instructional support (r = .39, p < .001, ES = Medium), accommodating diversity (r = .44, p < .001, ES = Medium), classroom management (r = .39, p < .001, ES = Medium), and care and concern scores (r = .34, p < .001, ES = Medium).

Table 2. Correlations between Educational Belief Sub-dimensions and Pedagogical Knowledge and Skill Scores (n=403)

	Progressivism	Existentialism	Reconstructionism	Perennialism	Essentialism
	r_s (95% CI) [a,b]	r_s (95% CI)	r_s (95% CI)	r_s (95% CI)	r_s (95% CI)
Total	.54** (.47 – .61)	.48** (.40 – .55)	.51** (.44 – .58)	.41** (.32 – .49)	-.06 (-.16 – .04)
Student Learning	.52** (.44 – .59)	.45** (.36 – .52)	.47** (.38 – .54)	.43** (.34 – .50)	-.04 (-.14 – .09)
Lesson Planning	.55** (.48 – .62)	.48** (.40 – .56)	.47** (.39 – .55)	.38** (.29 – .46)	-.09 (-.19 – .01)
Instructional Support	.45** (.37 – .53)	.39** (.31 – .48)	.41** (.32 – .49)	.29** (.19 – .38)	-.06 (-.16 – .04)
Accommodating Diversity	.46** (.37 – .53)	.44** (.36 –.52)	.45** (.37 – .53)	.32** (.22 – 0.40)	-.11* (-.21 – -.01)
Classroom Management	.47** (.38 – .54)	.39** (.30 – .47)	.48** (.40 – .56)	.34** (.25 – .43)	-.01 (-.10 – .10)
Care and Concern	.42** (.33 – .50)	.34** (.25 – .43)	.37** (.28 – .45)	.33** (.23 – .41)	-.05 (-.15 – .05)

*p<.05, ** p<.001, r_s = Spearman's rho Correlation Coefficient, (95% CI)= 95% confidence interval generates a lower and upper limit for the correlation coefficient. [a]Estimation was based on Fisher's r-to-z transformation, [b]Estimation of standard error was based on the formula proposed by Fieller, Hartley, and Pearson.

Significant positive correlations were identified between the participants' Reconstructionism educational belief scores and their total pedagogical knowledge and skills scores (r = .51, p < .001, ES = Large). Specifically, Reconstructionism scores were positively associated with student learning (r = .47, p < .001, ES = Medium), lesson planning (r = .47, p < .001, ES = Medium), instructional support (r = .41, p < .001, ES = Medium), accommodating diversity (r = .45, p < .001, ES = Medium), classroom management (r = .48, p < .001, ES = Medium), and care and concern (r = .37, p < .001, ES = Medium).

Furthermore, Perennialism educational belief scores showed significant positive correlations with total pedagogical knowledge and skills scores (r = .41, p < .001, ES = Medium). Positive correlations were also observed between Perennialism and student learning (r = .43, p < .001, ES = Medium), lesson planning (r = .38, p < .001, ES = Medium), instructional support (r = 0.29, p < .001, ES = Medium), accommodating diversity (r = .32, p <.001, ES = Medium), classroom management (r = .34, p < .001, ES = Medium), and care and concern

scores (r = .33, p < .001, ES = Medium).

In contrast, while a significant negative correlation was found between Essentialism educational belief scores and accommodating diversity (r = -.11, p = .031, ES = Small), no significant relationships were identified between Essentialism and any other sub-dimensions of the pedagogical knowledge and skills scale (p > .05).

The mean total score for the participants' pedagogical knowledge and skills scale was calculated as 167.1±19.2. Kruskal-Wallis test results revealed that participants' total pedagogical knowledge and skill scores differed significantly based on their dominant educational beliefs (H(4) = 25.98, p < .001, η^2 = .06, medium effect). Pairwise comparisons conducted with Bonferroni correction for multiple tests demonstrated that total scores differed significantly between participants holding the following dominant belief pairs: Essentialism–Existentialist education (98.28, p = .031), Essentialism–Reconstructionism (164.84, p < .001), Progressivism–Reconstructionism (-82.38, p = .001), and Existentialist education–Reconstructionism (-66.55, p = .004) (Figure 1).

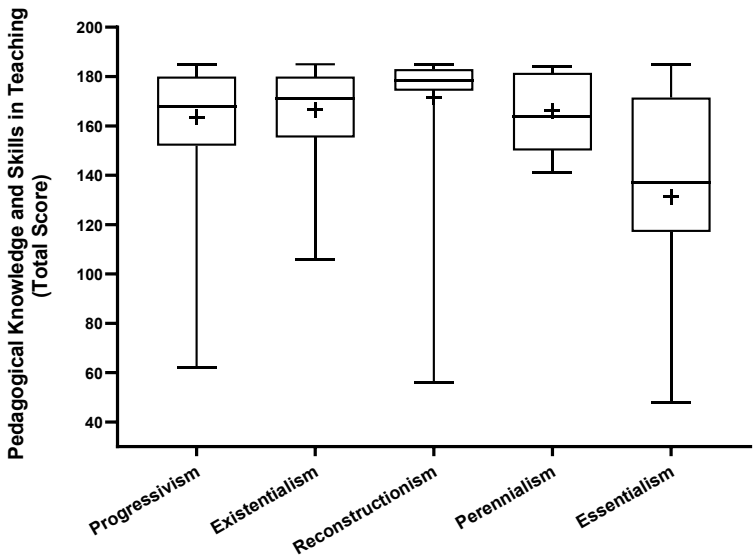

Figure 1. Participants' total pedagogical knowledge and skill scores according to their dominant educational beliefs

The participants' scores in the student learning sub-dimension of pedagogical knowledge and skills differed significantly according to their educational beliefs (H(4) = 21.34, p < .001, η^2 = .04, small effect). Pairwise comparisons with Bonferroni correction for multiple tests revealed that student learning scores varied between participants holding Essentialism-Reconstructionism (149.35, p < .001), Progressivism-Reconstructionism (-71.541, p = .006), and Existentialist education-Reconstructionism (-60.10, p = .012) beliefs (Figure 2A).

Furthermore, participants' scores in the lesson planning sub-dimension showed significant variation based on their educational beliefs (H(4) = 29.38, p < .001, η^2 = .06, medium effect). Post-hoc analysis indicated that lesson planning scores differed significantly across the following belief groups: Essentialism-Existentialist education (101.82, p = .018), Essentialism-Perennialism (119.88, p = 0.022), Essentialism-Reconstructionism (161.07, p <

.001), Progressivism-Reconstructionism (-89.37, p < 0.001), and Existentialism-Reconstructionism (-59.26, p = .014) (Figure 2B).

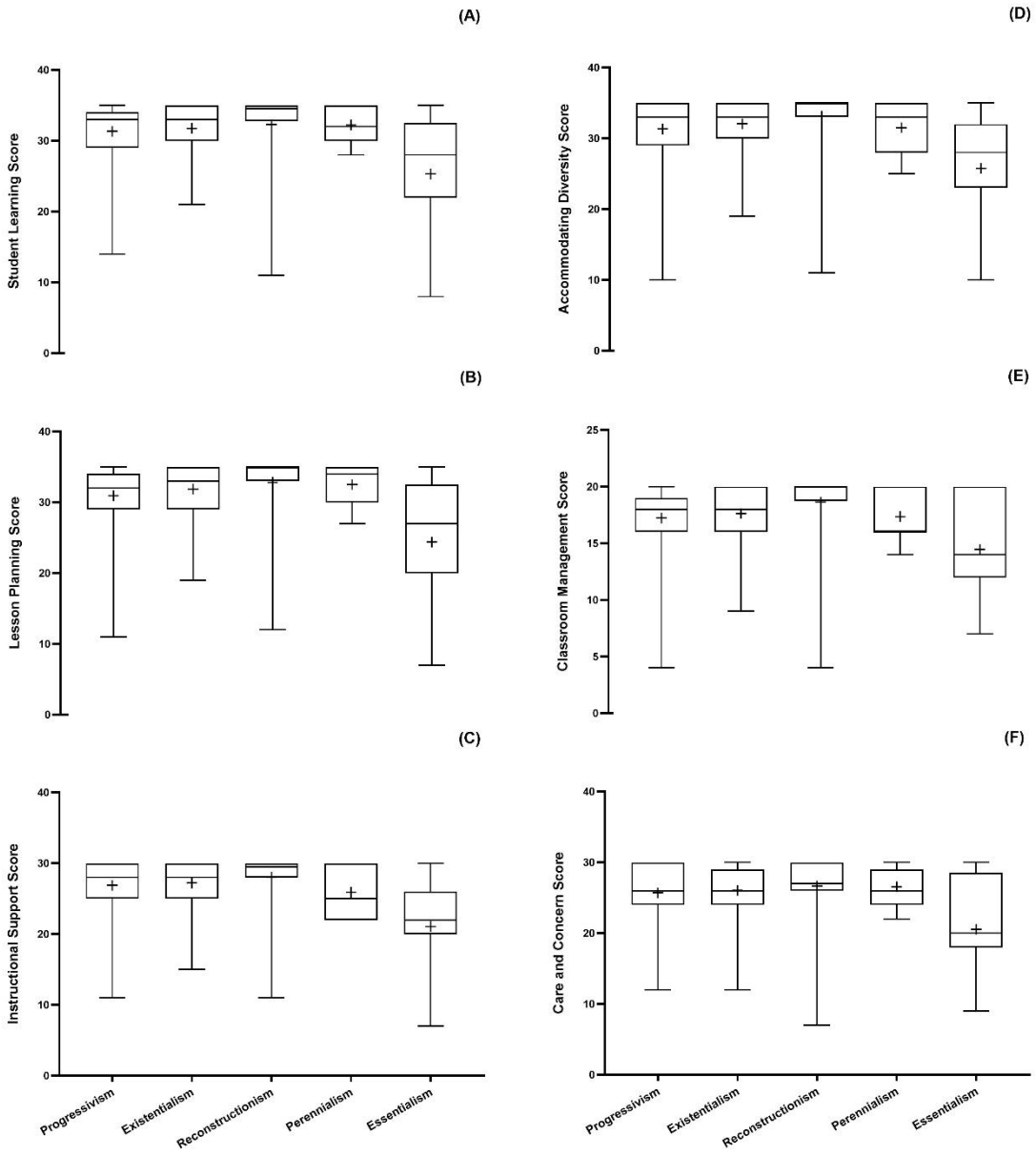

Figure 2. Pedagogical knowledge and skill sub-dimension scores according to participants' educational beliefs. (A) Student learning scores by educational beliefs, (B) Lesson planning scores by educational beliefs, (C) Instructional support scores by educational beliefs, (D) Accommodating diversity scores by educational beliefs, (E) Classroom management scores by educational beliefs, (F) Care and concern scores by educational beliefs.

The participants' instructional support scores differed significantly according to their educational beliefs (H(4) = 26.75, p < .001, η^2 = .06, medium effect). Pairwise comparisons indicated that instructional support scores varied significantly between those holding Essentialism–Progressivism (109.63, p = .011), Essentialism–Existentialist education (121.42, p = .002), Essentialism–Reconstructionism (168.54, p < .001), Perennialism–Reconstructionism (89.687, p = .015), and Progressivism–Reconstructionism (-58.91, p = .042) beliefs (Figure 2C).

Similarly, scores for accommodating diversity showed significant variation based on educational beliefs (H(4) =

25.22, $p < .001$, $\eta^2 = .05$, small effect). Significant differences in accommodating diversity scores were observed between the following belief pairs: Essentialism–Progressivism (94.52, $p = .046$), Essentialism–Existentialist education (105.44, $p = .010$), Essentialism–Reconstructionism (164.01, $p < .001$), and Progressivism–Reconstructionism (-69.49, $p = .006$; -58.57, $p = .013$) (Figure 2D).

Classroom management scores also varied significantly according to educational beliefs ($H(4) = 28.663$, $p < .001$, $\eta 2 = .06$, medium effect). Specifically, significant differences were identified between participants with Essentialism–Reconstructionism (151.60, $p < .001$), Perennialism–Reconstructionism (98.36, $p = .005$), Progressivism–Reconstructionism (-91.22, $p < .001$), and Existentialist education–Reconstructionism (-78.75, $p < .001$) orientations (Figure 2E).

Finally, scores for the care and concern sub-dimension differed significantly based on educational beliefs ($H(4) = 12.34$, $p = .015$, $\eta^2 = .02$, small effect). Post-hoc comparisons revealed that care and concern scores differed significantly only between the Essentialism and Reconstructionism groups (124.97, $p = .006$) (Figure 2F).

Discussion

In this study, which examined pre-service teachers' curriculum expertise within the framework of pedagogical knowledge and educational beliefs, the findings reveal that the predominant educational belief among participants is Existentialism (56.6%), followed by Progressivism (22.6%), while Essentialism (3.2%) constitutes the least adopted orientation. The prevalence of Existentialism among prospective teachers suggests a notable inclination toward student-centered and contemporary pedagogical paradigms. This finding aligns with the work of Avcı and Kutluca (2022), who reported a similar tendency toward student-centered belief systems. Furthermore, the existing literature consistently demonstrates that a vast majority of teachers and pre-service teachers identify with contemporary philosophies such as Existentialism and Progressivism, while showing a minimal preference for traditional, teacher-centered Essentialism (Altınkurt et al., 2012; Balcı & Küçükoğlu, 2019; Berkant & Özaslan, 2019; Çelik & Orçan, 2020; Dağ & Çalık, 2020; Deryakulu & Atal-Köysüren, 2018; Döğer & Akman, 2025; Eğmir & Çelik, 2019; Engin et al., 2016; Yaralı, 2020).

The widespread adoption of student-centered beliefs may be attributed to the long-term impact of constructivist approach implemented in the Turkish education system since 2005. Moreover, these beliefs demonstrate a timely alignment with the recently introduced The Century of Türkiye Education Model, which further consolidates student-centered frameworks within teacher education. The overwhelming preference among pre-service teachers for student-centered orientations—notably Existentialism and Progressivism—signifies a philosophical readiness for the pedagogical transformation envisioned by this new curriculum. This suggests that the current profile of pre-service teachers exhibits a significant level of philosophical readiness for the pedagogical transformation envisioned by the new curriculum. Furthermore, in a longitudinal study, Doğanay and Sarı (2018) further supports this by illustrating a decline in Perennialism and Idealism scores alongside an increase in Existentialism during undergraduate education, suggesting that teacher education effectively shifts philosophical preferences toward contemporary orientations. However, divergent findings are also observed in the literature; for instance, Taşkın

(2020) reported that physics, chemistry, and biology teachers prioritized Progressivism while ranking Existentialism last. Similarly, Luprandado et al. (2025) found that pre-service physical education teachers exhibited a multifaceted and flexible orientation by highly endorsing a broad spectrum of educational beliefs, including Perennialism, Existentialism, Progressivism, and Essentialism.

One of the notable findings of the research is that Progressivism, Existentialism, Reconstructionism, and Perennialism are positively associated with pedagogical knowledge and skills at moderate to high levels (r = .41–.54), whereas no significant relationship was observed for Essentialism. These correlations suggest that educational beliefs are not merely theoretical preferences but serve as a fundamental cognitive resource shaping pedagogical practice. Specifically, the link between contemporary philosophies and higher pedagogical scores appears to indicate that student-centered frameworks naturally facilitate the development of instructional competencies. Consequently, pre-service teachers who embrace student-centered and flexible philosophies are better equipped in terms of pedagogical competencies—such as instructional planning, understanding student learning, and classroom management—suggesting that such beliefs naturally underpin their teaching skills. As emphasized by Northcote (2009), teachers' educational beliefs serve as the theoretical underpinning for the specific instructional strategies they employ, thereby guiding their pedagogical practices. This finding aligns with Pajares's (1992) assertion that beliefs constitute the single most potent indicator in the processes of perceiving information and guiding decision-making. Conversely, the absence of a significant relationship between pedagogical knowledge and Essentialism—a rigid, teacher-centered philosophy—may suggest that teacher-centered paradigms are incompatible with contemporary pedagogical competencies. It is also noteworthy that while both are traditional, Perennialism showed a positive correlation unlike Essentialism. This may be because Perennialism prioritizes intellectual cultivation and reasoning, which aligns with the cognitive demands of pedagogical knowledge, whereas Essentialism's focus on rote compliance may hinder the development of flexible instructional skills. Indeed, as emphasized by Richardson (1996), the profound connection between educational beliefs and teaching-learning practices implies that a pre-service teacher will exhibit a high propensity to cultivate pedagogical skills in this direction only if they subscribe to a student-centered philosophy. Moreover, the high-quality pedagogical implementation skills defined by Gökçek and Yılmaz (2019) fundamentally necessitate a philosophical belief that is student-centered and supportive of development. Consistent with the findings of the present study, research conducted by Büyükalan Filiz et al. (2018) concluded that there is a positive relationship between pre-service teachers' educational beliefs and their techno-pedagogical competencies.

Another notable finding of the study is that pre-service teachers' total scores for pedagogical knowledge and skills varied significantly depending on the educational beliefs they adopted. This superiority of the Reconstructionist group can be attributed to the philosophy's focus on social structures and systemic change. While Existentialism—the most common belief—prioritizes the individual, Reconstructionism positions the teacher as an active agent of social transformation. Since pedagogical domains such as 'Classroom Management' and 'Lesson Planning' inherently involve managing complex social structures and organizational processes, it is consistent that candidates with a Reconstructionist orientation demonstrate higher competence in these areas. While Existentialism focuses on the individual's internal world, Reconstructionism demands an active engagement with external realities to reshape them. This inherent action-orientation of Reconstructionism may naturally predispose

these candidates to develop stronger practical competencies compared to purely introspective philosophies. Supporting this, Kagan (1992) emphasizes that the educational beliefs held by teachers directly shape their practical applications in the field of teaching and learning. The fact that pre-service teachers holding Reconstructionist beliefs demonstrated higher proficiency in domains such as student learning, planning, instructional support, and classroom management may indicate a strong alignment between this belief system and contemporary pedagogy. Conversely, the lower pedagogical scores observed among pre-service teachers adhering to Essentialism can be considered an indication that the rigid and teacher-centered structure of this philosophy is misaligned with the skills targeted by modern teacher education programs. Indeed, the literature underscores that contemporary educational philosophy orientations directly bolster teaching-learning competencies (Şahan, 2020), whereas traditional beliefs constrain modern pedagogical proficiencies (Büyükalan Filiz et al., 2018). Similarly, Avcı and Kutluca (2022) stated that student-centered beliefs, when combined with pedagogical content knowledge, strongly predict the quality of instructional practices. Furthermore, the finding that pedagogical knowledge varies significantly based on educational beliefs corroborates the positive relationship between high levels of pedagogical knowledge and contemporary educational philosophies such as Progressivism, Existentialism, and Reconstructionism. This can be interpreted as an indication of the need to further develop contemporary pedagogical approaches within teacher education programs. When evaluated in conjunction, these two findings align with the extant literature emphasizing the robust link between educational beliefs and pedagogical knowledge and practices (Kagan, 1992; Northcote, 2009; Pajares, 1992; Richardson, 1996). Consequently, the results underscore the necessity of reinforcing diversity-sensitive, democratic, and student-centered contemporary approaches within teacher education.

Although the results of this study offer valuable insights into understanding the pedagogical competencies of pre-service teachers, they are subject to certain limitations. One primary limitation is that the data were collected using quantitative measurement tools and relied on pre-service teachers' self-reports, which precludes the direct observation of their practical skills in actual classroom settings. In future research, employing mixed methods that corroborate quantitative data with qualitative observations and interviews could facilitate a more in-depth examination of the link between beliefs and practices. In addition to the reliance on self-reported data, the sample structure being limited to a single faculty of education constrains the generalizability of the findings. Furthermore, the cross-sectional nature of the study did not permit the observation of changes in beliefs and pedagogical competencies over time. Consequently, it is recommended that future studies involve larger sample groups from various universities and utilize longitudinal designs to investigate the long-term effects of the education process on beliefs. Finally, the fact that other potential variables influencing candidates' pedagogical scores, including the quality of courses taken, academic achievement, demographic characteristics, and socio-economic status, were not controlled for may be considered a limitation. Therefore, it is suggested that future research conduct comprehensive analyses evaluating demographic and extraneous variables (e.g., academic achievement, socio-economic status, type of high school graduated from, and parental education levels) that may affect pre-service teachers' pedagogical knowledge and skill levels. Regarding practical implications, the lower pedagogical scores of pre-service teachers holding traditional beliefs, such as Essentialism, indicate a need for teacher education programs to incorporate more experiences designed to transform these belief systems in line with modern and student-centered approaches. Accordingly, it is recommended to integrate reflective thinking activities into course

content, not only to enable candidates to critically question their existing educational beliefs but also to cultivate the 'reflective practitioner' identity conceptualized by Schön (1983).

Conclusion and Recommendations

In conclusion, the findings regarding the general trend of pre-service teachers' educational beliefs towards a modern orientation, their high levels of pedagogical knowledge and skills, the positive relationship between modern beliefs and pedagogical proficiency, and the significant differentiation in pedagogical knowledge based on educational beliefs, when evaluated in conjunction with the relevant literature, can be considered an indication of the pre-service teachers' high level of curriculum expertise. The high level of curriculum expertise among pre-service teachers may serve as a significant indicator that they have internalized the 'reflective practitioner' identity conceptualized by Schön (1983) during their professional development processes. This suggests that the candidates not only possess theoretical knowledge but are also capable of transforming this knowledge into practical competence by filtering it through a student-centered lens. In this context, the robust link between modern educational beliefs and pedagogical competence demonstrates that pre-service teachers are being cultivated as competent educators who reflect on their actions and ground their practices on a theoretical foundation. When viewed through the perspective of the 'belief-practice nexus' described by Northcote (2009, p. 69), it can be asserted that the pre-service teachers hold a high potential for implementing student-centered strategies in their professional lives. Ultimately, these findings confirm that the synthesis of contemporary educational beliefs and pedagogical knowledge is the key driver of curriculum expertise, as conceptualized by Ennis (1994).

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** In this study, all rules stated to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions stated under the title "Actions Against Scientific Research and Publication Ethics", which is the second part of the directive, was not taken.

Ethical review board name: Necmettin Erbakan University Social and Human Sciences Scientific Research Ethics Committee (Date of ethics review decision: 09/07/2021, Ethics assessment document issue number: 2021/403).

***Statement of Interest*:** We have no conflict of interest to declare.

Data Availability Statement: Data are available on reasonable request from the authors.

Author Contributions: All authors contributed to the study's conception and design. **Özgül Balcı** was responsible for data collection, formal analysis, and drafting the manuscript. **Güngör Yumuşak** contributed to the methodology, interpretation of results, and critical revision of the manuscript. All authors read and approved the final manuscript.

***Funding*:** None

***Acknowledgments*:** None

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International Journal of Current Educational Studies

2025, Vol. 4, No. 2, 89-111 ISSN 2822-4914

Left Behind at the Margins: Gender and the Unequal Landscape of Reading Literacy in South Africa

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Article Info

Article Type

Original Research

Article History

Received:
10 October 2025
Accepted:
03 December 2025
Published online:
04 December 2025

Abstract

Literacy is foundational for cognitive development, lifelong learning, and socio-economic participation. However, a notable gap remains in examining reading literacy within the general population. This study aims to identify the gendered factors influencing reading literacy in South Africa. A nationally representative sample of 10,297 individuals was analyzed using multivariate logistic regression in STATA. Results revealed notable gender disparities. Younger participants were more likely to be literate, with higher effects among males (OR = 2.87, 95% CI [1.66, 4.95]) than females (OR = 2.47, 95% CI [1.27, 4.79]). Education was the strongest predictor; females with secondary education showed the highest effect (OR = 190.79, 95% CI [124.61, 292.10]), while males with higher education demonstrated a similar impact (OR = 98.91, 95% CI [28.61, 341.99]). Media exposure, particularly radio listening and internet use, has a positive influence on literacy outcomes. Regional disparities persisted, with Limpopo, Mpumalanga, Eastern Cape, and North West exhibiting disproportionately low literacy levels. These findings underscore the need for targeted educational interventions tailored to high-illiteracy provinces, including adequate resources and funding for community-based reading centers and adult education programs, ensuring equitable access to quality education.

Keywords: Educational attainment, gendered inequalities, internet usage, socioeconomic inequalities, South Africa.

Citation:

Mokoena, O. P., & Sesale, E. L. (2025). Left Behind at the Margins: Gender and the unequal landscape of reading literacy in South Africa. *International Journal of Current Education Studies (IJCES)*, *4*(2), 89-111. https://doi.org/10.46328/ijces.216

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Introduction

Literacy is foundational for cognitive development, lifelong learning, and socio-economic participation. In literature, literacy is defined in four domains: the ability to read, write, speak, and listen in a way that allows effective communication and understanding of the world (Gee, 2012; Roser & Ortiz-Ospina, 2018). In this study, literacy is operationally defined as the ability to read part or an entire sentence, as assessed through standardized survey instruments. Literacy transcends the traditional boundaries of reading and writing; it is a critical competency for navigating an increasingly digital, data-driven, and interconnected global society (Samanta, 2025). As education systems and labour markets undergo rapid digital transformation, individuals lacking foundational literacy and digital skills are systematically excluded from economic participation and civic engagement (Duma et al., 2021; Khatun, 2021; Olanrewaju et al., 2021; Reddy et al., 2023). This exclusion is not evenly distributed; it disproportionately affects populations in low and middle-income countries, particularly girls, refugees, and children with disabilities, who remain excluded by formal education systems (Crea et al., 2022; Makuyana, 2022; Mahlaule et al., 2024; Walton et al., 2024). Apart from academic achievement, literacy is foundational to cognitive and socio-emotional development, fostering critical thinking, communication, and collaboration skills essential for 21st-century citizenship and innovation (Maoulida et al., 2023; Thornhill-Miller et al., 2023).

Countries with persistently low literacy rates, such as those in Africa, including South Africa, often face compounding challenges of economic stagnation and high unemployment (Azevedo & Nnadozie, 2019; Khumalo, 2020). Moreover, several authors show that literacy is a determinant of health literacy, which reveals individuals' ability to access, interpret, and act on health information, which is an increasingly vital skill in the context of global health crises (Coughlin et al., 2020; Shahid et al., 2022; Mills, 2024). In this context, literacy is not merely an educational outcome but a strategic lever for equity, resilience, and sustainable development. Several other studies also highlight the persistent gender disparities in reading literacy, with females consistently outperforming males across diverse educational contexts (Fonseca et al., 2023; Mahmoud et al., 2022; Thomas et al., 2024). While this trend is well-documented in reading assessments, it contrasts sharply with gendered underperformance in Science, Technology, Engineering, and Mathematics (STEM) domains, where females often lag in mathematics and science (Ghimire, 2024). These inconsistencies invite further investigation into the sociocultural and structural dynamics that shape gendered learning trajectories. Eriksson et al. (2020) and Fonseca et al. (2023) highlight the subtle interplay of cultural norms and socioeconomic conditions, noting that although the gender gap in reading is marginal in high-income countries, it remains pronounced in low and middle-income contexts. Additionally, Chiu (2018) identifies psychosocial factors, such as motivation, parental support, and reading engagement, as critical drivers of the female literacy advantage, suggesting that affective and environmental influences may amplify gendered outcomes.

Moreover, researchers such as Mdleleni et al. (2021), Unterhalter et al. (2022), and Muyambi & Ahiaku (2025) reveal that persistent gender gaps reflect more profound systemic inequalities in access, quality, and educational outcomes. At the same time, Himmler and Jäckle (2018) and Blanchard (2023) reveal that literacy catalyzes employability and the proliferation of high incomes. Furthermore, other studies highlight the socioeconomic

inequalities and their impact on literacy. That is, individuals from lower socioeconomic backgrounds often face several limitations in literacy development due to multiple factors, such as limited access to books, inadequate language exposure, and insufficient parental support (Chiu, 2018; Eriksson et al., 2020; Fonseca et al., 2023). Several authors argue that addressing gender disparities in literacy development is central to achieving the Sustainable Development Goals (SDGs), specifically SDG 4 (quality education) and SDG 5 (gender equality) (Abdulkadri et al., 2022; Akinwale, 2023; Leal Filho et al., 2023).

While a wealth of literature on reading literacy exists, it predominantly focuses on academic populations, such as high school and university students, with a strong emphasis on educational outcomes and academic performance. A notable gap remains in studies that examine reading literacy within the general population. Those that do exist tend to focus narrowly on specific subgroups (Griese et al., 2023; Pakpour et al., 2023; Sansakorn et al., 2024), literacy in older adults (Oh et al., 2021), or are limited to systematic reviews and cross-sectional snapshots (Oh et al., 2021; Estrela et al., 2023). Additionally, this study conceptually integrates socioeconomic and demographic factors, combined with media exposure, to better understand their effects on shaping gendered literacy outcomes, using data from a pre-pandemic period. To our knowledge, this study represents the first comprehensive investigation into the determinants of reading literacy among the general South African population, utilizing nationally representative historical (pre-pandemic) data from the 2016 SADHS. Grounded in a gender sensitive analytical framework, the study addresses the following research questions:

1. What are the key determinants of reading literacy among males and females in South Africa, based on the 2016 SADHS?
2. How do socioeconomic factors (wealth index, employment) influence reading literacy differently for males and females?
3. What role do internet usage and media exposure play in shaping gendered literacy outcomes?
4. To what extent do demographic variables (age, urban/rural residence, province, educational attainment, marital status) mediate the relationship between gender and reading literacy?

Theoretical Background

There exist numerous theoretical foundations for grounding the concept of reading literacy. This study is grounded on the structural inequality theory (SIT) to provide rigidity for understanding how structural, individual, and contextual factors shape the gendered literacy outcomes. Naylor et al. (2019) define SIT as a framework that examines conditions where individuals experience unequal opportunities regarding roles, rights, opportunities, and decision-making compared to their counterparts. SIT positions us to consider how individuals make explicit and implicit positioning acts that determine whether they have access to the same opportunities and experiences as other groups. In our context, the legacy of apartheid dispensation resulted in a deeply bifurcated education system, where access to quality schooling was determined by race, geographic location, and socioeconomic status (Clercq, 2020).

SIT offers a critical foundation for constructing a cohesive analytical model that explains the differential

distribution of reading literacy. The persistent disparities in literacy outcomes are not merely the result of individual attributes or choices, but are systematically produced and sustained by entrenched institutional, socioeconomic, and socio-political structures (Sithomola, 2021; Khumalo & Alhassan, 2021; Nag, 2023). Within which, SIT manifests through the paradoxical effects of education and digital access resources traditionally associated with empowerment. Several studies reveal that individuals with higher levels of education and internet use exhibit better literacy outcomes, suggesting that access alone does not guarantee protection. Instead, these resources may proliferate exposure to literacy environments, amplify social expectations, or reflect greater awareness and reporting capacity (Arends et al., 2021; Gogus et al., 2024; Schmidt et al., 2015; Torraco, 2018; Croizet et al., 2019). By incorporating this theory, the analytical model can transcend surface-level associations and capture the deeper, systemic challenges, such as unequal access to protective infrastructure, gendered power relations, and digital divides, that shape individual experiences and outcomes.

Hypothesis Formulation

Socio-Economic Factors

In South Africa, disparities in access to quality education and literacy resources are closely tied to household income and employment conditions. Zickafoose et al. (2024) highlight that funding constraints and unequal resource allocation in Sub-Saharan Africa disproportionately affect marginalized communities, limiting access to inclusive and equitable education. Gendered dimensions of socioeconomic status further complicate literacy outcomes. Chikwe et al. (2024) demonstrate that women in low-income communities face compounded barriers to literacy due to limited access to financial resources, employment opportunities, and educational support. Furthermore, the authors also emphasize that community-based interventions, such as microfinance and vocational training, are effective in improving women's literacy and economic resilience, especially in low-resource communities. Khan et al. (2024) conducted a study examining gender differences among university students. They found that socioeconomic factors, such as parental income and employment status, have a more substantial influence on the academic performance of female students than on that of males. Based on the arguments, it can be hypothesized that:

H1: Socioeconomic factors (wealth index and employment status) are significantly associated with reading literacy, and these associations differ by gender, see Figure 1.

Media Exposure and Internet Usage

Different perceptions concerning the effects of watching television on reading literacy are evident in the literature. Supper et al. (2021) report no direct or indirect effect between watching television and reading. Interestingly, Skvarc et al. (2021) report that being from families with high socioeconomic status and watching educational programs without entertainment is associated with lower academic achievement. In another study, Jensen et al. (2016) found that exposure to research-based television programs had a significant impact on children's ability to read for leisure. Internet usage can be beneficial when used correctly, that is, to gather reading materials and interact with other people through blogs and social media platforms. According to Erwinda (2023), when the

internet is used for sourcing reading materials, students' reading comprehension is significantly improved. On the other hand, Derksen et al. (2022) highlight the benefits of restricted internet access in improving English and Biology test scores; interestingly, the improvement was observed among low achievers. It can, therefore, be hypothesized that:

H2: Access to internet usage and media exposure is positively associated with reading literacy, with more potent effects observed among females, see Figure 1.

Demographic Factors

Recent studies highlight the complex interplay between age, socioeconomic status, and literacy outcomes, challenging traditional narratives that literacy improves linearly with age due to accumulated experience and exposure. Evidence from South African studies suggests that adolescents aged 15–19 exhibit higher reading literacy than older adults, a trend attributed to improved access to educational resources, curriculum reforms, and digital integration (Makumbila & Rowland, 2016; Kasimba, 2024). In contrast, older generations were educated under historically unequal systems marked by under-resourced schools, limited access to quality instruction, and exclusionary pedagogies (Arends et al., 2021; Clercq, 2020; Khumalo & Alhassan, 2021; Soudien, 2024). According to Zickafoose et al. (2024), educational attainment remains a key determinant of reading literacy outcomes, with individuals who have completed secondary or tertiary education demonstrating higher literacy levels. These unique disparities are not merely a generational thing, but structurally embedded. Women, especially in rural and poor regions, face compounded barriers due to intersecting inequalities in education, employment, and access to digital infrastructure. These findings yielded the following hypotheses:

H3: Demographic variables (age, urban/rural residence, educational attainment, and marital status) significantly influence the relationship between gender and reading literacy, see Figure 1.

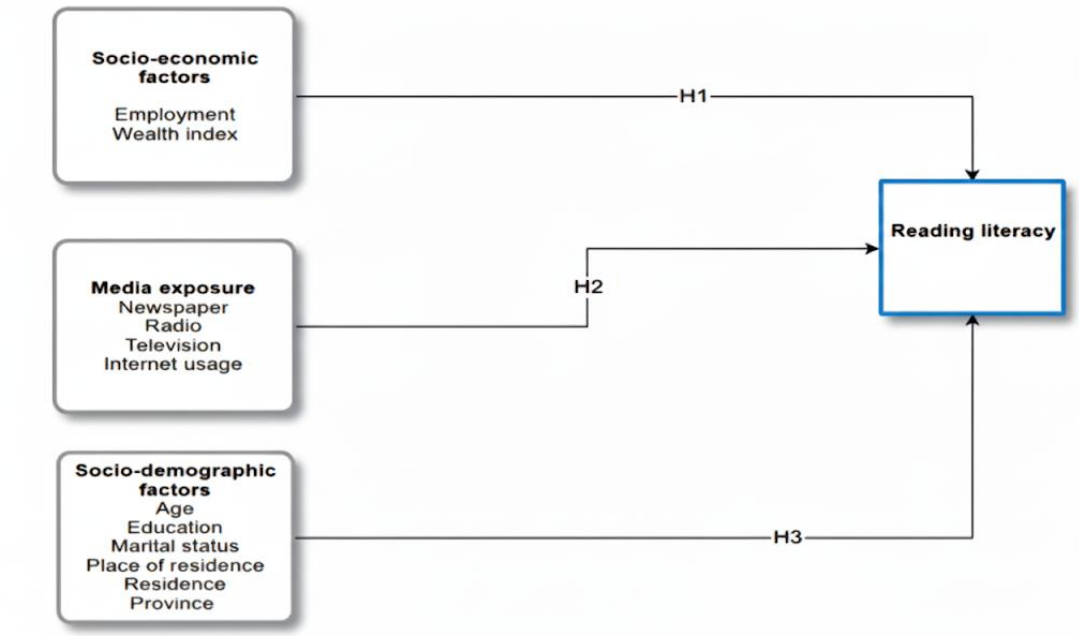

Figure 1. Conceptual Framework of Reading Literacy

Method

The study used a retrospective cross-sectional study design to analyze the determinants of reading literacy among participants. Data were collected through structured questionnaires administered to a representative sample of individuals across various provinces in South Africa. The SADHS 2016 includes all men aged 15–59 and women aged 15– 49 who were residing in one of the nine provinces 24 hours prior to the survey. Statistics South Africa and the South African Medical Research Council sampled a total of 12,132 individuals, comprising 8,514 women (aged 15-49) and 3,618 men (aged 15-59). The survey used the 2011 South African population census as the master sampling frame and employed a stratified two-stage random sampling technique. In the first stage, enumeration areas (EAs) were stratified by province and categorized as either urban or non-urban. In the second stage, households were randomly selected from each of the EAs. To effectively utilize this rigorously determined sample size and ensure continuity and statistical power, this study will integrate and analyze all respondents from the original dataset who have complete information on literacy. Data were gathered on various demographic, socioeconomic, and educational variables.

These included age, gender, marital status, education level, employment status, wealth index, type of residence, and province of residence. Additionally, information on participants' media exposure (i.e., reading newspapers, listening to the radio, watching television, and using the internet) was collected from June to November 2016, using two questionnaires for males and females. The questionnaires are available online (https://dhsprogram.com/pubs/pdf/FR337/FR337.pdf) (National Department of Health [NDoH], 2019). The South African Demographic and Health Survey (SADHS) employed standardized DHS instruments, recognized globally for their methodological rigor and established face validity. Data collection was conducted by extensively trained field workers, with each team supervised by a senior professional nurse to ensure procedural trustworthiness. The instruments were uniformly administered across all provinces, thereby enhancing both the reliability and validity, as well as the cross-regional comparability of the data. Data were extracted from the. DTA files were exported to Microsoft Excel using STATA version 16.1 (StataCorp, Texas, USA) for further editing and recoding.

The Excel spreadsheet was then exported to STATA for further analysis. Continuous data were tested for normality, and the results are represented as mean and standard deviation. Categorical data were represented using frequencies and percentages. To test for the association between reading literacy and socioeconomic and demographic factors, as well as media exposure, Chi-square tests were employed. Variables with a p-value less than 0.05 were considered statistically significant. Univariate analysis was conducted to identify significant determinants affecting reading literacy for both genders. Variables with a p-value less than 0.25 were considered for inclusion in the multivariate model (Hosmer et al., 2013). In the multivariate model, variables having a p-value less than 0.05 were statistically significant. The univariate and multivariate models were also used to determine the odds ratios for factors affecting reading literacy, while adjusting for potential confounders. All identifiers that could assist in identifying study participants were de-linked from the dataset. Participants were informed of the purpose of the survey and that they could withdraw at any stage without reason. The survey protocol (SADHS 2016) was reviewed and approved by the SAMRC Ethics Committee and the ICF Institutional Review Board.

Results

The study included 10,297 participants aged 15 to 95. The mean age was 39.24±18.17. Of these, over 50% were females, and 2964 (28.68%) of the participants were 50 years and above. KwaZulu-Natal had the largest number of participants, at 1,571 (15.20%), followed by Limpopo with 1,410 (13.64%). The Western Cape recorded the lowest number of participants, with 754 (7.29%). Most participants, 5,685 (55%), resided in urban areas, while 6,668 (64.51%) had attained secondary school education. Additionally, black participants were the largest group among the racial groups, comprising 8,752 (84.67%). Furthermore, 5,686 (55.01%) of the participants were single. Furthermore, the majority of the participants, 4174 (40.38%), belonged to the low-class wealth index. Table 1 summarizes the participants' demographic characteristics.

Table 1. Description of Participants' Demographic Characteristics

Variable	n (%)
Gender	
Female	6096 (59.20%)
Male	4201 (40.80%)
Age	
15-19	1435 (13.94%)
20-24	1287 (12.50%)
25-29	1202 (11.67%)
30-34	1056 (10.26%)
35-39	857 (8.32%)
40-44	798 (7.75%)
45-59	724 (7.03%)
≥ 50	2938 (28.53%)
Province	
Eastern Cape	1347 (13.08%)
Free State	1027 (9.97%)
Gauteng	1028 (9.98%)
KwaZulu-Natal	1566 (15.21%)
Limpopo	1409 (13.68%)
Mpumalanga	1216 (11.81%)
North West	1081 (10.50%)
Northern Cape	875 (8.50%)
Western Cape	748 (7.26%)
Place of residence	
Rural	4630 (44.96%)
Urban	5667 (55.04%)

Level of education	
No education	865 (8.40%)
Higher	952 (9.25%)
Primary	1821 (17.68%)
Secondary	6659 (64.67%)
Ethnicity	
Black	8722 (84.70%)
Coloured	984 (9.56%)
Indian/Asian	140 (1.36%)
White	451 (4.38%)
Marital status	
Divorced	174 (1.69%)
Living with a partner	954 (9.26%)
Married	2712 (26.34%)
Single	5674 (55.10%)
Widowed	783 (7.60%)
Wealth index	
Low	4152 (40.32%)
Middle	2246 (21.81%)
Upper	3899 (37.87%)
Employment	
Unemployed	6891 (66.92%)
Employed	3406 (33.08%)
Read a newspaper/magazine.	
Yes	6090 (59.14%)
No	4207 (40.86%)
Listen to the radio	
Yes	7558 (73.40%)
No	2739 (26.60%)
Watch television	
Yes	8409 (81.66%)
No	1888 (18.34%)
Use internet	
Yes	3875 (37.63%)
No	6422 (62.37%)

In Table 2, the results were highly significant, indicating the strong relationship between socioeconomic and demographic factors with reading literacy by gender. A closer examination of both genders reveals that reading literacy decreases with increasing age of the participants ($p < 0.05$). Residing in provinces of Limpopo, Mpumalanga, Eastern Cape, and North West is significantly associated with illiteracy among both males and

females ($p < 0.05$). Moreover, females residing in rural areas exhibit higher rates of illiteracy in reading than their male counterparts ($p < 0.05$). Interestingly, males without formal education demonstrate higher reading literacy levels than females without formal education, and the results were significant ($p < 0.05$). Additionally, widowed and married individuals of both genders show higher reading illiteracy compared to other marital status groups ($p < 0.05$). Furthermore, the study also highlights that unemployed males were more literate than unemployed females ($p < 0.05$), suggesting that employment status has a differential impact on reading literacy across genders. Moreover, both males and females who engage in reading newspapers or magazines and use the internet had higher reading literacy levels compared to those who primarily watch television or listen to the radio ($p < 0.01$).

Table 2. Summary of the Association between Ability to Read and Demographic Characteristics

Variable	Female		p-value	Male		p-value
	Reading literate			Reading literate		
	Yes (n = 5388)	No (n = 708)		Yes (n = 3761)	No (n = 440)	
Age						
15-19	717 (98.22%)	13 (1.78%)	< 0.001	679 (96.31%)	26 (3.69%)	< 0.001
20-24	668 (97.38%)	18 (2.62%)		565 (94.01%)	36 (5.99%)	
25-29	699 (98.31%)	12 (1.69%)		464 (94.50%)	27 (5.50%)	
30-34	600 (96.62%)	21 (3.38%)		406 (93.33%)	29 (6.67%)	
35-39	502 (96.35%)	19 (3.65%)		317 (94.35%)	19 (5.65%)	
40-44	431 (93.09%)	32 (6.91%)		303 (90.45%)	32 (9.55%)	
45-59	411 (90.53%)	43 (9.47%)		244 (90.37%)	26 (9.63%)	
≥ 50	1360 (71.20%)	550 (28.80%)		784 (76.17%)	245 (23.83%)	
Province						
Eastern Cape	679 (85.19%)	118 (14.81%)	<0.001	480 (87.27%)	70 (12.73%)	< 0.001
Free State	594 (92.24%)	50 (7.76%)		358 (93.47%)	25 (6.53%)	
Gauteng	529 (94.80%)	29 (5.20%)		439 (93.40%)	31 (6.60%)	
KwaZulu-Natal	854 (88.59%)	110 (11.41%)		550 (91.36%)	52 (8.64%)	

Limpopo	709 (82.25%)	153 (17.75%)		449 (87.74%)	98 (17.92%)	
Mpumalanga	587 (83.62%)	115 (16.38%)		451 (89.48%)	63 (12.26%)	
North West	504 (87.35%)	73 (12.65%)		451 (87.74%)	53 (10.52%)	
Northern Cape	481 (91.97%)	42 (8.03%)		320 (90.91%)	32 (9.09%)	
Western Cape	451 (96.16%)	18 (3.84%)		263 (94.27%)	16 (5.73%)	
Place of residence						
Rural	2266 (82.46%)	482 (17.54%)	< 0.001	1593 (84.64%)	289 (15.36%)	< 0.001
Urban	3122 (93.25%)	226 (6.75%)		2168 (93.49%)	151 (6.51%)	
Level of education						
No education	96 (16.61%)	482 (83.39%)	< 0.001	88 (30.66%)	199 (69.34%)	< 0.001
Higher	563 (100%)	0 (0%)		386 (99.23%)	3 (0.77%)	
Primary	856 (82.79%)	178 (17.21%)		627 (79.67%)	160 (20.33%)	
Secondary	3873 (98.78%)	48 (1.22%)		2660 (97.15%)	78 (2.85%)	
Ethnicity						
Black	4495 (87.18%)	661 (12.82%)	< 0.001	3156 (88.50%)	410 (11.50%)	< 0.001
Coloured	561 (92.73%)	44 (7.27%)		351 (92.61%)	28 (7.39%)	
Indian/Asian	74 (96.10%)	3 (3.90%)		62 (98.41%)	1 (1.59%)	
White	258 (100%)	0 (0%)		192 (99.48%)	1 (0.52%)	
Marital status						
Divorced	107 (91.45%)	10 (8.55%)	< 0.001	50 (87.72%)	7 (12.28%)	< 0.001
Living with a partner	485 (90.15%)	53 (9.85%)		364 (87.50%)	52 (12.50%)	
Married	1336 (88.89%)	167 (11.11%)		1051 (86.93%)	158 (13.07%)	

Single	3028 (92.77%)	236 (7.23%)		2216 (91.95%)	194 (8.05%)	
Widowed	432 (64.09%)	242 (35.91%)		80 (73.39%)	29 (26.61%)	
Wealth index						
Low	2014 (80.82%)	478 (19.18%)	< 0.001	1403 (84.52%)	257 (15.48%)	< 0.001
Middle	1229 (90.17%)	134 (9.83%)		794 (89.92%)	89 (10.08%)	
Upper	2145 (95.72%)	96 (4.28%)		1564 (94.33%)	94 (5.67%)	
Employment status						
Unemployed	3731 (85.87%)	614 (14.13%)	< 0.001	2225 (87.39%)	321 (12.61%)	< 0.001
Employed	1657 (95.63%)	95 (5.37%)		1536 (92.81%)	119 (7.19%)	
Read a newspaper/magazine						
Yes	2758 (100%)	0 (0%)	< 0.001	2751 (100%)	0 (0%)	< 0.001
No	1076 (78.77%)	290 (21.23%)		1010 (69.66%)	440 (30.34%)	
Listen to the radio						
Yes			< 0.001	3137 (91.35%)	297 (8.65%)	< 0.001
No				624 (81.36%)	143 (18.64%)	
Watch television						
Yes			< 0.001	3307 (91.86%)	293 (8.14%)	< 0.001
No				454 (75.54%)	147 (24.46%)	
Use internet						
Yes	2076 (99.43%)	12 (0.57%)	< 0.001	1763 (98.66%)	24 (1.34%)	< 0.001
No	3312 (82.63%)	696 (17.37%)		1998 (82.77%)	416 (17.23%)	

Determinants of Reading Literacy by Gender

The multivariate analysis identified several variables with exceptionally high odds ratios, indicating strong predictions with reading literacy. Education level was the most dominant predictor across both genders. Among females, those who attained secondary education had the highest odds (OR = 190.79; 95% CI: 124.61–292.10; p < 0.001). This unusually large OR may indicate quasi-complete separation, so we should be cautious in interpreting it and further consider confidence intervals and model diagnostics. Females with primary education were (OR = 24.89; 95% CI: 18.32–33.83; p < 0.001) more likely to be literate. Additionally, among males, the highest odds were observed in individuals with higher education (OR = 98.91; 95% CI: 28.61–341.99; p < 0.001), followed by those with secondary education (OR = 53.60; 95% CI: 34.95–82.20; p < 0.001) and primary education (OR = 9.26; 95% CI: 6.52–13.15; p < 0.001). Internet use was another significant predictor of reading literacy. Females who reported using the internet had nearly three times the odds of reading literacy (OR = 2.85; 95% CI: 1.43–5.67; p = 0.003), while males had more than threefold increased odds (OR = 3.60; 95% CI: 2.20–5.88; p < 0.001). Furthermore, age was particularly influential among females aged 15–19 years, who had significantly elevated odds compared to those aged 20 years and above (OR = 2.47; 95% CI: 1.27–4.79; p = 0.007). Males in the same age category also showed a strong prediction (OR = 2.87; 95% CI: 1.66–4.95; p < 0.001). Listening to the radio was associated with increased odds for both sexes. Females who listened to the radio had nearly double the odds (OR = 1.94; 95% CI: 1.47–2.54; p < 0.001), while males had a modest but significant increase (OR = 1.43; 95% CI: 1.06–1.94; p = 0.018). Employment status was significantly associated with females, with employed women having higher odds compared to males (OR = 1.74; 95% CI: 1.23–2.47; p < 0.001); however, this prediction was not statistically significant in the male group. The results are summarized in Table 3.

Table 3. Summary of Determinants of Reading Literacy by Gender

Variable	Female				Male			
	Univariate		Multivariate		Univariate		Multivariate	
	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value
Age								
≥ 50	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
15-19	22.30 (12.77, 38.45)	< 0.001*	2.47 (1.27, 4.79)	0.007**	8.17 (5.38, 12.40)	< 0.001*	2.87 (1.66, 4.95)	< 0.001**
20-24	14.01 (9.30, 24.22)	< 0.001*	1.36 (0.74, 2.50)	0.322	4.91 (3.41, 7.08)	< 0.001*	1.00 (0.59, 1.68)	0.997
25-29	23.56 (13.20, 42.04)	< 0.001*	2.13 (1.07, 4.25)	0.032**	5.38 (3.56, 8.13)	< 0.001*	1.06 (0.61, 1.85)	0.824
30-34	11.55 (7.40, 18.05)	< 0.001*	2.00 (1.05, 3.79)	0.034**	4.38 (2.93, 6.56)	< 0.001*	1.12 (0.66, 1.91)	0.669

35-39	10.68 (6.69, 17.07)	< 0.001*	1.94 (1.04, 3.64)	0.038**	5.22 (3.22, 8.48)	< 0.001*	1.82 (0.99, 3.33)	0.053
40-44	5.45 (3.75, 7.91)	< 0.001*	1.86 (1.08, 3.22)	0.026**	2.96 (2.00, 4.38)	< 0.001*	1.60 (0.96, 2.68)	0.073
45-59	3.87 (2.78, 5.37)	< 0.001*	1.68 (1.03, 2.73)	0.036**	2.94 (1.91, 4.51)	< 0.001*	1.73 (0.99, 3.01)	0.053
Province								
North West	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Eastern Cape	0.83 (0.61, 1.14)	0.255	1.25 (0.77, 2.01)	0.363	0.81 (0.55, 1.18)	0.265	0.58 (0.35, 0.96)	0.033**
Free State	1.72 (1.18, 2.51)	0.005*	2.06 (1.14, 3.72)	0.017**	1.68 (1.03, 2.76)	0.039*	0.74 (0.39, 1.38)	0.338
Gauteng	2.64 (1.69, 4.13)	< 0.001*	1.58 (0.82, 3.05)	0.171	1.66 (1.05, 2.64)	0.031*	0.50 (0.27, 0.90)	0.021**
KwaZulu-Natal	1.12 (0.82, 1.54)	0.466	2.49 (1.51, 4.11)	< 0.001**	1.24 (0.83, 1.86)	0.289	1.20 (0.71, 2.03)	0.501
Limpopo	0.67 (0.50, 0.91)	0.009*	1.36 (0.84, 2.20)	0.216	0.54 (0.38, 0.77)	0.001*	0.23 (0.14, 0.38)	< 0.001**
Mpumalanga	0.74 (0.54, 1.01)	0.061*	1.06 (0.65, 1.75)	0.808	0.84 (0.57, 1.24)	0.383	0.48 (0.29, 0.81)	0.006**
Northern Cape	1.66 (1.11, 2.47)	0.013*	2.06 (1.03, 4.10)	0.040**	1.18 (0.74, 1.86)	0.493	1.01 (0.52, 1.95)	0.971
Western Cape	3.63 (2.13, 6.17)	< 0.001*	2.29 (0.94, 5.55)	0.067	1.93 (1.08, 3.45)	0.026*	0.42 (0.18, 0.97)	0.043**
Place of residence								
Rural	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Urban	2.94 (2.49, 3.47)	< 0.001*	1.12 (0.78, 1.62)	0.529	2.60 (2.12,3.20)	< 0.001*	1.24 (0.89, 1.72)	0.207
Level of education								
No education	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Primary	24.15 (18.39, 31.70)	< 0.001*	24.89 (18.32, 33.83)	< 0.001**	8.86 (6.53, 12.02)	< 0.001*	9.26 (6.52, 13.15)	< 0.001**
Secondary	405.12 (282.87, 580.19)	< 0.001*	190.79 (124.61, 292.10)	< 0.001**	77.12 (55.05, 108.04)	< 0.001*	53.60 (34.95, 82.20)	< 0.001**
Higher	-	-	-	-	290.96 (90.91, 931.24)	< 0.001*	98.91 (28.61, 341.99)	< 0.001**
Ethnicity								
Black	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Coloured	1.87 (1.36, 2.58)	< 0.001*	1.30 (0.66, 2.57)	0.444	1.63 (1.09, 2.43)	0.016*	1.31 (0.68, 2.50)	0.422
Indian/Asian	3.63 (1.14, 11/54)	0.029*	2.97 (0.54, 16.51)	0.213	8.05 (1.11, 58.24)	0.039*	1.10 (0.14, 9.00)	0.927
White	-	-	-	-	24.94 (3.49, 178.46)	0.001*	3.13 (0.40, 24.60)	0.278
Marital status								
Married	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Divorced	1.34 (0.69, 2.61)	0.393	1.07 (0.39, 2.90)	0.899	1.07 (0.48, 2.41)	0.863	1.00 (0.33, 3.00)	0.998
Living with a partner	1.14 (0.83, 1.58)	0.419	0.85 (0.50,1.42)	0.527	1.05 (0.75, 1.47)	0.766	0.81 (0.51, 1.27)	0.355
Single	1.60 (1.30, 1.98)	< 0.001*	0.98 (0.70, 1.38)	0.924	1.72 (1.37, 2.15)	< 0.001	0.62 (0.44, 0.89)	0.009**
Widowed	0.22 (0.18, 0.28)	< 0.001*	0.75 (0.52, 1.08)	0.128	0.41 (0.26, 0.65)	< 0.001	0.76 (0.40, 1.43)	0.390
Wealth index								
Low	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Middle	2.18 (1.77, 2.67)	< 0.001*	1.19 (0.83, 1.69)	0.345	1.20 (0.76, 1.89)	0.437	1.17 (0.83, 1.63)	0.371
Upper	5.30 (4.22, 6.66)	< 0.001*	2.97 (0.94, 2.35)	0.090	3.36 (2.05, 5.51)	< 0.001	1.45 (1.03, 2.06)	0.035**
Employment status								
Unemployed	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Employed	2.90 (2.32, 3.63)	< 0.001*	1.74 (1.23, 2.47)	< 0.001**	1.86 (1.49, 2.32)	< 0.001	1.27 (0.95, 1.70)	0.103
Listen to the radio								
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Yes	3.56 (3.03, 4.18)	< 0.001*	1.94 (1.47, 2.54)	< 0.001**	2.42 (1.95, 3.01)	< 0.001	1.43 (1.06, 1.94)	0.018**
Watch Television								
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Yes	3.96 (3.36, 4.66)	< 0.001*	1.18 (0.87, 1.59)	0.285	3.65 (2.93, 4.56)	< 0.001	1.44 (1.06, 1.97)	0.021**
Use internet								
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Yes	36.36 (20.49, 64.50)	< 0.001*	2.85 (1.43, 5.67)	0.003**	15.29 (10.09, 23.19)	< 0.001	3.60 (2.20, 5.88)	< 0.001**

Discussion

The findings of this study reveal a complex interplay between education, internet access, age, and media exposure in shaping the reading literacy outcomes. Individuals with secondary and tertiary education exhibited significantly higher odds of literacy, with particularly pronounced effects among females who had completed secondary education. Consistent with the study finding, several studies (Fırat & Koyuncu, 2023; Pamuk et al., 2023; Mihret & Joshi, 2025) report the incremental effect of educational level on reading literacy levels. Inconsistent with the study finding, Liu et al. (2022) show that individual and family-level factors outweigh school-level determinants in predicting literacy, further challenging the idea that educational level alone determines literacy outcomes, similarly, Li et al. (2025) further shows that socioeconomic status and home learning environment mediate reading ability more than grade level, suggesting that educational level alone is not the primary driver of literacy. Furthermore, Leachman et al.'s (2025) findings were also consistent with the study findings; the authors showed that the correlation between reading text and reading comprehension decreased with an increase in educational level. The findings of this study converge with the conventional assumption that education uniformly enhances literacy. However, educational attainment may function as a double-edged sword, facilitating access to literacy-enabling resources for those with high socioeconomic status, while simultaneously exposing structural limitations in contexts of systemic educational inequality and low socioeconomic status. This paradox is best understood through the lens of the SIT, which asserts that institutional norms, access to capital, and representational power systematically reproduce social and cognitive disparities (Eybers & Paulet, 2022; Croizet et al., 2019). Education, while a critical driver of empowerment, operates within historically uneven systems that often fail to translate access into equitable literacy outcomes. Arends et al. (2021) and Soudien (2024) argue that the South African education system continues to reproduce substandard outcomes due to entrenched inequalities rooted in apartheid-era legacies of race, gender, and geography. The elevated literacy odds among educated individuals may reflect increased awareness and reporting, but more critically, they may reveal the structural limitations of education in environments lacking adequate resources and pedagogical support (Fırat & Koyuncu, 2023; Pamuk et al., 2023).

Digital access, particularly radio and internet use, emerged as a significant predictor of reading literacy, further highlighting the role of the digital divide as a contemporary manifestation of socio-cultural stratification. While digital access is often perceived as a tool for inclusion, studies by Duma et al. (2021) and Derksen et al. (2022) highlight that unbalanced digital literacy and infrastructure exacerbate disparities in reading literacy, among others. Individuals who use the internet, particularly those with higher educational attainment, may be more exposed to online misinformation or exploitative content, especially in the absence of robust digital literacy frameworks (Reddy et al., 2023; Samanta, 2025), and this finding was inconsistent with our finding, which did not account for misinformation of media exposure. This argument aligns with the evidence presented by Naylor and Mifsud (2019), which suggests that structural inequalities in higher education extend into digital domains, reinforcing exclusion even among underprivileged populations. The reason for this result could be that South Africa has unequal access to digital infrastructure, especially between urban and rural areas. Internet use strongly predicts literacy because individuals with access often belong to households with better resources, thereby reinforcing socioeconomic stratification. Also, historically disadvantaged communities still face limited connectivity and affordability issues, making digital access a marker of privilege rather than universal inclusion.

Age-related trends further complicate the literacy landscape; adolescents aged 15–19 years demonstrated higher literacy outcomes compared to older adults, challenging developmental assumptions that literacy improves with age. This generational reversal reflects the impact of recent curriculum reforms, digital integration, and targeted literacy interventions that emphasize reading fluency and comprehension (Makumbila & Rowland, 2016; Kasimba, 2024). In contrast, older adults were educated under historically unequal systems characterized by limited access, under-resourced schools, and exclusionary pedagogies (Clercq, 2020; Arends et al., 2021; Khumalo & Alhassan, 2021; Soudien, 2024). From the SIT perspective, these disparities are not merely generational but structurally embedded, shaped by access to institutional support, cultural capital, and responsive pedagogies (Eybers & Paulet, 2022; Street, 1984). The reason for this finding may be that adolescents (15–19 years old) have benefited from recent curriculum reforms that emphasize reading fluency, comprehension, and digital integration. These reforms introduced literacy-focused interventions and improved teaching strategies, giving younger participants an advantage. Furthermore, younger learners are often exposed to technology and online resources, which complement traditional reading practices. Schools are also increasingly incorporating Information and Communication Technology tools and e-learning platforms, which older generations did not have access to.

Implications and Recommendations

Practical Implications and Recommendations

The study findings can be practically applied through several strategic steps to improve reading literacy. Targeted educational programs should be developed, focusing on different age groups, particularly younger participants aged 15-19 years, to maintain and enhance literacy skills as they grow. Gender sensitive initiatives are essential to address the unique challenges faced by both genders, such as mobile libraries and community reading groups for females in rural settings. Regional inequalities necessitate customized literacy programs for provinces such as Limpopo, Mpumalanga, Eastern Cape, and North West, where illiteracy rates are higher. Additionally, distinct strategies for urban and rural settings, such as establishing reading centers and providing digital literacy tools, can help bridge the gap between urban and rural areas.

Leveraging media and technological tools is important; encouraging the use of newspapers, magazines, and the internet can disseminate educational content widely. Moreover, promotion of digital literacy through access to e-books and online resources can significantly improve reading literacy levels, especially in remote areas. Furthermore, workplace literacy programs that target unemployed individuals and support employed individuals through workplace learning initiatives can improve both literacy and employability. Community collaboration, on the other hand, is vital, with community-based programs and family literacy initiatives fostering a culture of reading at home. Moreover, policy development and advocacy campaigns informed by the study's findings can help reduce literacy inequalities and provide equitable access to quality education.

Based on these findings, several key recommendations emerge for policymakers, educators, and community stakeholders. First, it is essential to incorporate media exposure into lesson plans and curricula to improve reading

literacy and academic performance in both young and older adults. Educational institutions should integrate newspapers, digital media, and internet-based resources as core components of literacy instruction, recognizing their significant role in shaping reading outcomes.

Second, distinct strategies tailored to urban and rural settings must be initiated. This includes establishing accessible reading centers in underserved communities and providing digital literacy tools at zero cost to bridge the technology gap. Special attention should be given to provinces with high illiteracy rates, such as Limpopo, Mpumalanga, the Eastern Cape, and the North West, where targeted interventions can have the most substantial impact.

Third, gender-responsive programming should be prioritized, ensuring that interventions address the unique barriers faced by males and females in a differentiated manner. For instance, mobile libraries and community reading groups may be particularly effective for females in rural settings, while alternative engagement strategies may be needed for males showing lower literacy rates.

Fourth, policymakers should leverage the findings to develop evidence-based literacy policies that ensure equitable access to quality education across all demographic groups. This includes allocating resources to digital infrastructure, particularly in rural areas, and supporting workplace literacy programs that enhance both literacy skills and employability outcomes. Finally, future research should employ longitudinal designs to establish causal relationships between internet use, educational attainment, and reading literacy, while also examining the evolving impact of digital technologies on literacy development in the post-pandemic context.

Theoretical Implications

The findings of this study have several important theoretical implications for understanding literacy development within the framework of structural inequality. By demonstrating that internet use, educational attainment, and media exposure significantly influence reading literacy, the study reinforces the theory of new literacies, which states that digital engagement is central to modern literacy practices. Furthermore, the observed gender differences and regional disparities underscore the relevance of structural inequality theory, indicating that access to resources and opportunities is unevenly distributed across various settings. These theoretical implications underscore the need to reconceptualize literacy as not only a cognitive skill but also a socially embedded practice shaped by technology, gender, and socioeconomic status.

Limitations of the Study

Despite the valuable insights provided, this study has several limitations that should be acknowledged. Firstly, the use of cross-sectional data from the 2016 SADHS restricts the ability to establish causal relationships between internet use, educational attainment, and reading literacy. Additionally, key variables such as internet access, media exposure, and literacy status are based on self-reported responses, which may be subject to recall bias or social desirability bias. The measurement of reading literacy itself may not fully capture the complexity of literacy skills, including comprehension and digital literacy. Moreover, the data reflect conditions from 2016, and

significant changes in digital access and educational practices, particularly following the COVID-19 pandemic, are not well represented. These limitations suggest the need for cautious interpretation of the findings and highlight areas for future research.

Conclusion

The study examined the determinants of reading literacy by gender, utilizing the 2016 South African Demographic and Health Survey data. Socioeconomic and demographic variables, as well as media exposure, were associated with reading literacy in both genders. The multivariate logistic regression model underpinned factors such as age, educational attainment, and internet usage as key predictors of reading literacy. The study also revealed socioeconomic and regional inequalities that necessitate customized literacy programs for provinces such as Limpopo, Mpumalanga, the Eastern Cape, and the North West, where illiteracy rates are higher. Moreover, the study further demonstrated the benefits of media exposure, including reading newspapers, listening to the radio, watching television, and using the internet, in shaping reading literacy outcomes.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** We hereby declare that research/publication ethics, as well as citation principles, have been considered throughout all stages of the study. We take full responsibility for the content of the paper in the event of any dispute. This study does not involve qualitative or quantitative data collection methods that require ethics committee approval, such as surveys, interviews, focus groups, observations, experiments, or similar techniques. Therefore, obtaining approval from an ethics committee is not required for this research.

***Statement of Interest*:** We have no conflict of interest to declare.

Data Availability Statement: Data are publicly available on Data First.

Author Contributions: All authors contributed to the conception and design of the study. **OP Mokoena** was responsible for data collection, formal analysis, and drafting the manuscript. **EL Sesale** contributed to the methodology, interpretation of results, and critical revision of the manuscript. All authors read and approved the final manuscript.

***Funding*:** None

***Acknowledgments*:** None

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International Journal of Current Educational Studies

2025, Vol. 4, No. 2, 112-137 ISSN 2822-4914

Managing Artificial Intelligence Ethics in Higher Education: A Systematic Framework for Issues and Policy Recommendations

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Article Info

Article Type

Review Article

Article History

Received:

05 November 2025

Accepted:

21 November 2025

Published online:

22 November 2025

Abstract

The integration of artificial intelligence (AI) in higher education has raised significant ethical and governance challenges. Despite growing scholarly attention, systematic governance frameworks remain underdeveloped, creating a gap between rapid AI adoption and institutional capacity to manage ethical implications. Guided by PRISMA 2020 guidelines, this systematic review synthesizes 55 peer-reviewed studies from Web of Science (2022-2025) to examine: (1) ethical issues and risks, (2) governance frameworks and policies, (3) governance gaps and limitations, and (4) evidence-based recommendations. Findings reveal research predominantly focuses on individual-level ethical awareness, with privacy, academic integrity, and algorithmic bias most frequently addressed, while institutional governance studies remain scarce. Institutional responses are primarily reactive and provisional rather than strategic. Five persistent governance gaps were identified: limited governance capacity, fragmented coordination, low AI ethics literacy, underrepresentation of equity perspectives, and weak evaluation mechanisms. This study proposes four targeted recommendations: establishing centralized governance committees, developing mandatory ethics literacy programs, implementing systematic evaluation mechanisms, and ensuring equity-oriented approaches. These findings underscore the need for institutions to transition from ad hoc responses to comprehensive, integrated AI ethics frameworks that embed ethical principles into their institutional strategy, ensuring the responsible and equitable use of AI.

Keywords: Artificial Intelligence, AI Ethics, Higher Education, Ethical Governance, Policy Framework.

Citation:

Kaşarcı, İ., Akın Demircan, Z., Çeliker Ercan, G., & İnci, T. (2025). Managing artificial intelligence ethics in higher education: A systematic framework for issues and policy recommendations. *International Journal of Current Education Studies (IJCES), 4*(2), 112-137. https://doi.org/10.46328/ijces.223

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Introduction

The rapid expansion of artificial intelligence (AI) technologies has profoundly reshaped higher education, with the release of ChatGPT in November 2022 representing a decisive inflection point for teaching, learning, assessment, and institutional governance. In a matter of months, AI-driven applications have become embedded across higher education functions, including personalized learning systems, automated grading, admissions decision-making, student support services, and research assistance (Kasneci et al., 2023; Sullivan et al., 2023). This accelerated adoption has generated substantial opportunities for pedagogical innovation while simultaneously introducing complex ethical, legal, and policy challenges that institutions remain ill-equipped to manage systematically.

Technology has historically transformed educational practices, from the fifteenth-century printing press to twentieth-century broadcast media and contemporary digital platforms (UNESCO, 2021; Kikalishvili, 2023). However, the current AI wave differs qualitatively from prior technological innovations. Generative AI (GenAI) systems are capable of producing original content, providing advanced feedback, and executing cognitive tasks traditionally associated with human expertise (Evangelista, 2025). These capabilities disrupt core academic assumptions related to authorship, assessment validity, intellectual labor, and the epistemological foundations of higher education.

Institutional responses to AI integration have been notably inconsistent. While some universities have adopted innovation-oriented approaches that encourage experimentation and integration, others have imposed restrictive policies or temporary bans, particularly in relation to assessment and academic integrity (Freeman, 2025; Jin et al., 2025). This divergence reflects unresolved tensions: innovation versus risk management, autonomy versus compliance, and effectiveness versus ethical responsibility.

Comparative analyses of AI policies across different institutional and national contexts reveal substantial variation in both scope and strategic orientation (Alqahtani & Wafula, 2025; Rizki & Daoud, 2025). Leading universities have adopted diverse pedagogical strategies for AI integration, ranging from cautious experimentation to systematic curriculum redesign (Alqahtani & Wafula, 2025). Similarly, examinations of institutional practices in countries such as New Zealand demonstrate that even within relatively homogeneous higher education systems, individual institutions vary significantly in their policy formalization and implementation approaches (Rizki & Daoud, 2025).

Ethical Dimensions of AI in Higher Education

The ethical implications of AI integration have become a central focus of scholarly and policy debates. Contemporary AI ethics frameworks, drawing on foundational ethical principles such as beneficence, non-maleficence, autonomy, justice, transparency, and accountability, emphasize the heightened responsibility of educational institutions toward students and society (EDUCAUSE, 2025). These principles are particularly salient in higher education due to asymmetries of power, the sensitivity of educational data, and the long-term

consequences of academic decision-making.

Privacy and data governance concerns are especially pronounced. AI systems routinely process large volumes of sensitive student data, including academic records, behavioral analytics, and demographic information, raising concerns about informed consent, data security, surveillance, and the use of secondary data (Holmes et al., 2023). The integration of emerging technologies such as telepresence robots and gamification into educational governance systems further complicates data protection frameworks, requiring institutions to develop more sophisticated approaches to digital ethics and privacy management (Addas et al., 2024). These challenges necessitate socio-technical perspectives that account for the interplay between technological capabilities and human practices, particularly in language education contexts where AI tools mediate cultural and linguistic interactions (Babanoğlu et al., 2025). Reflecting these risks, the European Union's AI Act categorizes many educational AI applications as "high-risk," mandating robust transparency, accountability, and human oversight mechanisms (European Union, 2024).

Algorithmic bias constitutes a critical ethical risk across the educational spectrum. AI systems trained on historical datasets may reproduce existing inequalities in K-12 settings (Gouseti et al., 2024) and have been shown to systematically misidentify 'at-risk' students in higher education (Gándara et al., 2024). In higher education, such biases may influence admissions, grading, course recommendations, or funding decisions, undermining equity and social justice objectives.

Concerns related to academic integrity have intensified following the widespread availability of generative AI tools. The capacity of AI systems to generate essays, solve problems, and emulate scholarly discourse complicates conventional definitions of plagiarism, originality, and authentic learning (Cotton et al., 2023). Institutions continue to struggle with establishing consistent, ethically grounded policies that distinguish acceptable AI-supported learning from misconduct. Expert consensus studies employing Delphi methodology underscore the complexity of maintaining academic integrity in AI-enhanced research and teaching environments, revealing persistent disagreements among stakeholders regarding appropriate boundaries for AI assistance in scholarly work (Güneş & Liman Kaban, 2025). These tensions extend beyond assessment to encompass broader questions about the nature of intellectual contribution and authorship in an era of AI-augmented scholarship.

AI Governance Frameworks in Higher Education

While the ethical challenges of AI in higher education are now well documented, understanding how institutions have attempted to manage these issues requires attention to the emerging landscape of AI governance frameworks. Governance, in this context, refers to the structures, processes, and policies that institutions use to regulate, oversee, and guide the ethical use of AI technologies (Jobin et al., 2019; OECD, 2019).

Institutional approaches to AI governance vary considerably. Some universities have adopted centralized governance models, establishing dedicated AI ethics committees or task forces responsible for developing institution-wide policies and coordinating ethical oversight across academic and administrative units (Humble,

2025; Jin et al., 2025). These centralized approaches aim to ensure consistency, accountability, and strategic alignment with institutional missions. In contrast, other institutions have pursued distributed governance models, in which departments, faculties, or individual instructors develop localized guidelines tailored to discipline-specific needs (Evangelista, 2025; Grieve et al., 2024). While such approaches offer flexibility and contextual responsiveness, they risk fragmentation and inconsistent standards across the institution.

Policy instruments for AI governance also exhibit diversity. Usage guidelines represent the most common form of institutional response, providing normative recommendations on the acceptable use of AI in teaching, assessment, and research (Chan, 2023; An et al., 2025). More sophisticated approaches include risk-based frameworks that categorize AI applications according to their potential for harm and mandate differentiated oversight accordingly—an approach consistent with the European Union's AI Act, which classifies educational AI as "high-risk" (European Union, 2024). Additionally, some institutions have adopted AI impact assessments modeled on ethical impact assessments in technology governance, which require a systematic evaluation of AI tools prior to deployment (González-Fernández et al., 2025; Cherner et al., 2025). Policy development increasingly emphasizes the cultivation of digital competencies as a prerequisite for effective AI governance, with leading institutions recognizing that technical infrastructure alone is insufficient without corresponding investment in faculty and student AI literacy (Zhang & Tian, 2025). Some national contexts have developed heterarchical policy networks that engage government, industry, and academic stakeholders in collaborative governance arrangements, as evidenced by the British higher education sector's approach to AI policy coordination (Gellai, 2023). Furthermore, recent analyses highlight the value of cross-institutional learning, as institutions examine generative AI tools and draw policy insights from the experiences of early adopters (Rodrigues et al., 2025).

A key distinction in the governance literature pertains to the difference between "soft governance" and "hard regulation." Soft governance encompasses voluntary guidelines, ethical codes, and advisory mechanisms that rely on persuasion, professional norms, and reputational incentives rather than legal enforcement (Floridi et al., 2018). In contrast, burdensome regulation involves legally binding requirements, compliance mandates, and formal sanctions for violations. Most higher education AI governance currently operates within the soft governance paradigm, reflecting both the novelty of the challenges and the traditional emphasis on academic freedom and institutional autonomy (Kaya-Kasikci et al., 2025). However, as AI becomes more deeply embedded in consequential decisions, such as admissions, grading, and resource allocation, scholars increasingly call for more robust regulatory mechanisms that complement voluntary ethical frameworks (Jiang et al., 2025; Liu et al., 2025). This regulatory evolution is further complicated by the sub-symbolic nature of contemporary AI systems, which operate through pattern recognition and probabilistic inference rather than explicit rules, challenging traditional governance frameworks predicated on transparent, rule-based decision-making (Li et al., 2025). Such technical characteristics demand governance approaches that can accommodate opacity and uncertainty while still maintaining accountability.

Stakeholder Perspectives and Institutional Capacity for AI Ethics

AI ethics in higher education is not a single-actor phenomenon; instead, it involves multiple stakeholders with distinct perspectives, interests, and capacities. Understanding these stakeholder dynamics is essential for developing governance frameworks that are both legitimate and effective.

Faculty members occupy a critical position in AI ethics governance, as they are often the primary decision-makers regarding the use of AI in teaching and assessment. Research indicates that faculty perspectives on AI ethics are shaped by disciplinary norms, pedagogical beliefs, and concerns about workload and professional autonomy (Malik et al., 2025; Ravi et al., 2025). While many faculty express awareness of ethical concerns such as academic integrity and fairness, their capacity to translate this awareness into practice is often constrained by limited AI literacy and insufficient institutional guidance (Holmes et al., 2023). Academic staff perspectives reveal similar patterns of ambivalence, balancing recognition of AI's pedagogical potential against concerns about its effects on teaching quality, academic standards, and professional autonomy (Alnsour et al., 2025). Faculty members often report feeling underprepared to make informed decisions about the appropriate use of AI, highlighting the need for comprehensive professional development programs.

Student perspectives on AI ethics reflect a combination of pragmatic concerns and ethical reasoning. Studies suggest that students generally recognize the ethical dimensions of AI use, including issues of fairness, transparency, and academic honesty (Alnsour et al., 2025a; Usher et al., 2025). However, students also express uncertainty about institutional expectations and report inconsistent guidance across courses and instructors (Grieve et al., 2024; Villarino, 2024). Research on student perceptions reveals complex emotional responses to AI integration, including tensions between enthusiasm for AI's potential benefits and anxiety about its implications for learning authenticity and assessment validity (Qu et al., 2025). Cross-national studies indicate that while ethical awareness among students is widespread, their capacity to articulate coherent ethical positions varies considerably, often reflecting the quality and consistency of institutional guidance they receive (Medina-Gual & Parejo, 2025). This variability may contribute to confusion about acceptable practices and undermine the credibility of institutional policies.

Institutional priorities, regulatory compliance requirements, and resource constraints shape administrative perspectives on AI ethics. Administrators are typically responsible for developing and implementing institution-wide policies, yet they often face challenges in balancing innovation imperatives with risk management (Jin et al., 2025; Erhardt et al., 2025). Research suggests that administrative responses to AI ethics are often reactive, emerging in response to specific incidents or external pressures rather than being proactive and strategic (Humble, 2025). Administrators must also contend with evidence of AI's potential negative impacts on educational quality and institutional mission, including risks of over-reliance on automated systems, erosion of critical thinking skills, and exacerbation of educational inequalities (Nadim & Di Fuccio, 2025). For institutions serving international student populations, policy development is further complicated by visa regulations, cross-cultural ethical frameworks, and disparities in students' prior exposure to AI technologies (Nazir, 2025). These contextual factors demand administrative approaches that are simultaneously principled and flexible.

Institutional capacity for AI ethics governance depends on several key factors, including the availability of expertise, financial resources, and organizational structures that are capable of coordinating ethical oversight (Kong et al., 2023). Studies have highlighted that many institutions lack dedicated personnel with expertise in AI ethics, instead relying on existing ethics committees or ad hoc working groups (Spivakovsky et al., 2023). This capacity deficit constrains the development of comprehensive governance frameworks and contributes to the fragmented landscape of AI ethics management observed in the literature.

Pedagogical Innovation and AI Ethics Education

Beyond governance structures and stakeholder perspectives, a growing body of research examines how AI can be integrated into pedagogy in ways that simultaneously leverage its capabilities and cultivate ethical awareness. Design thinking approaches, for instance, demonstrate that AI can enhance creativity, critical thinking, and problem-solving capacities when embedded within pedagogical frameworks that emphasize ethical reasoning and reflection (Rana et al., 2025). Empirical studies suggest that when AI-enhanced learning environments are grounded in principles of fairness, transparency, and trust, they can positively influence learning performance while developing students' ethical sensitivity (Shahzad et al., 2025).

Immersive technologies represent a particularly promising avenue for ethics education. The integration of artificial intelligence with virtual reality creates experiential learning environments specifically designed to develop ethical decision-making competencies, enabling students to navigate complex ethical scenarios in simulated contexts before encountering similar challenges in professional practice (Tobias et al., 2025). Such pedagogical innovations highlight the need for comprehensive, full-cycle AI ethics education systems that integrate theoretical foundations with practical applications across the entire student lifecycle, from orientation through graduation (Xu et al., 2025).

These developments suggest that AI ethics in higher education should not be conceptualized solely as a governance challenge or risk management concern, but also as an opportunity for pedagogical renewal. Practical approaches integrate ethics into curriculum design, assessment practices, and co-curricular activities, treating ethical competence as a core learning outcome rather than an add-on compliance requirement.

Rationale for a Systematic Review

Despite increasing scholarly attention, systematic approaches to managing AI ethics in higher education remain limited. UNESCO (2021) reports that fewer than 10% of higher education institutions worldwide have formal policies governing AI. The literature is fragmented, often addressing isolated technologies, ethical issues, or stakeholder perspectives, thereby limiting its utility for comprehensive policy development.

A systematic review provides a methodologically rigorous approach to synthesizing the rapidly expanding body of research, identifying convergent findings, persistent gaps, and evidence-based policy implications. Moreover, higher education presents distinctive contextual features—academic freedom, research missions, institutional

complexity, and diverse student populations that necessitate tailored ethical frameworks rather than generalized educational technology policies.

Purpose and Research Questions

Accordingly, this study conducts a systematic review of literature published between 2022 and 2025 to synthesize evidence on ethical issues, governance frameworks, and policy responses related to the integration of AI in higher education. Guided by PRISMA principles, the review addresses the following research questions:

1. What ethical issues and risks are most frequently associated with AI integration in higher education?

2. What governance frameworks and policy approaches have been proposed or implemented to manage AI ethics?

3. What governance gaps, challenges, and limitations characterize current AI ethics management practices in higher education?

4. What evidence-based recommendations can inform the development of comprehensive AI ethics policies in higher education?

Method

Research Design

This study adopted a systematic literature review design in accordance with the PRISMA 2020 guidelines to synthesize existing research on ethical issues, governance approaches, and policy responses related to artificial intelligence (AI) in higher education. A systematic approach was selected to ensure transparency, methodological rigor, and replicability in reviewing a rapidly expanding and conceptually fragmented body of literature.

Data Source and Search Strategy

The literature search was conducted exclusively using the Web of Science (WoS) Core Collection, chosen for its high-quality indexing of peer-reviewed journals in education, educational technology, ethics, and higher education policy. The search covered publications from 2022 to 2025 (up to November 2025), reflecting the period following the widespread adoption of generative AI tools in higher education.

Search Query: The following search string was applied to the Web of Science Core Collection:
TS=("Artificial Intelligence" OR "AI") AND TS=ethic* AND TS="higher education"

This query was applied to Topic fields (title, abstract, author keywords, and Keywords Plus), which yielded 462,817 initial results. After applying the ethics filter (n=21,365) and higher education filter (n=1,101), the dataset

was refined for further screening. Only peer-reviewed journal articles published in English were considered. The search was limited to articles, review articles, and early access publications from Web of Science categories relevant to the research topic. Table 1 presents the criteria used to determine study eligibility.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Article Topic	Focuses on AI ethics, ethical challenges, governance, or policy development in higher education contexts.	Focuses solely on K–12, vocational, corporate, or non-formal education.
Document Type	Peer-reviewed journal articles.	Conference papers, book chapters, editorials, dissertations, reports, or grey literature.
Publication Period	Published between 2022 and November 2025 (covering the period of widespread generative AI adoption).	Published before 2022 or after November 2025.
Database	Indexed in Web of Science (WoS) Core Collection.	Indexed only in other databases (e.g., Scopus, ERIC) without WoS indexing.
Language	Written in English.	Not available in English.
Access	Full text available.	Abstract-only or not accessible.
Methodological Focus	Addresses ethical, governance, or policy dimensions of AI in higher education (empirical, review, conceptual).	Focuses solely on technical AI development without educational or ethical implications.
Relevance	Directly addresses AI ethics in higher education with substantive discussion of ethical issues, governance, or policy.	Mentions AI or ethics only tangentially; out-of-context references.

Study Selection

The study selection process followed the PRISMA 2020 framework and consisted of four stages: identification, screening, eligibility assessment, and final inclusion.

1. Identification (n=462,817): Initial search using the keywords "Artificial Intelligence" OR "AI" in the Web of Science Core Collection.
2. Filtration (n=72): Applied filters for ethics-related content (n=21,365), higher education context (n=1,101), document type (articles, review articles, and early access; n=72), publication years (2022-2025), and Web of Science category relevance.
3. Eligibility (n=59): Full-text availability was verified. Articles without accessible full text (n=13) were excluded.
4. Included (n=55): Full-text review was conducted to assess substantive relevance. Articles that mentioned

AI or ethics only tangentially or were out of context (n=4) were excluded, resulting in 55 articles included in the final synthesis.

Two researchers independently screened titles, abstracts, and full texts. Disagreements were resolved through discussion and consensus. Inter-rater reliability was calculated using Cohen's kappa (κ = 0.87), indicating strong agreement. The selection process is summarized using a PRISMA flow diagram in Figure 1.

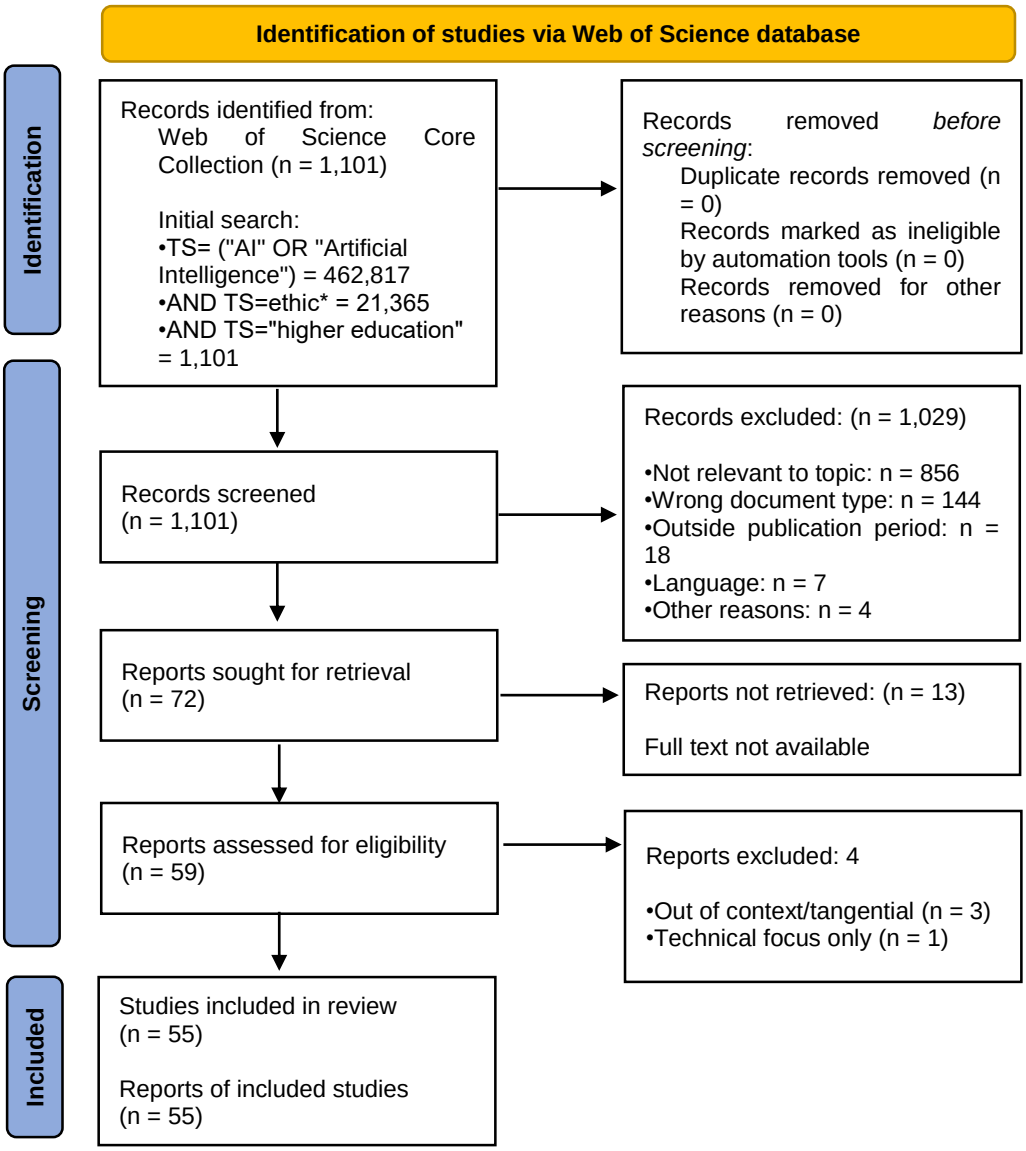

Figure 1. Article Selection Process

Data Extraction

A standardized data extraction form was developed to systematically capture key information from each included study. Extracted elements included:

- Bibliographic information (authors, year, journal) - Research focus and objectives - Methodological design

(empirical, conceptual, review) - Context and sample characteristics (if applicable) - Ethical issues identified - Governance or policy frameworks discussed - Main findings and recommendations

Data extraction was performed by the primary researcher and verified by a second researcher to ensure accuracy and consistency.

Data Analysis and Synthesis

Data were analyzed using a thematic synthesis approach following Braun and Clarke's (2006) guidelines. The analysis proceeded in three phases:

1. Initial coding: Line-by-line coding of extracted data to identify specific ethical issues, governance strategies, and policy recommendations.
2. Theme development: Codes were grouped into descriptive themes through iterative comparison and refinement. Themes were developed inductively from the data while remaining attentive to the study's research questions.
3. Analytical synthesis: Descriptive themes were further abstracted into analytical themes representing overarching patterns across the literature. Relationships between themes were mapped to develop a comprehensive understanding of the ethical landscape.

This synthesis enabled the identification of common ethical challenges, institutional governance strategies, and gaps in existing AI policy frameworks. The findings formed the basis for developing a systematic framework and evidence-based policy recommendations for higher education institutions.

Quality Appraisal

While formal quality assessment tools were not applied due to the conceptual and heterogeneous nature of the included studies, attention was given to the credibility, methodological clarity, and relevance of each study during data extraction and synthesis. Studies lacking clear methodology or substantive engagement with AI ethics in higher education were excluded during the full-text review stage.

Results

Following the PRISMA-guided selection process, 55 studies published between 2022 and November 2025 were included in the analysis. The findings were synthesized thematically to identify recurring ethical issues, governance mechanisms, and policy-oriented responses related to artificial intelligence (AI) in higher education. To present the results systematically and transparently, the included studies were categorized according to their primary focus, the ethical concerns addressed, and the policy or governance implications, and were summarized in the tables below. Tables 2-5 summarize the distribution of studies across these analytical dimensions.

Table 2. Distribution of Studies by Main Focus Area, Ethical Issues, and Governance Orientation

Focus Area	Representative Studies	Main Ethical Issues	Governance Orientation
AI ethics awareness and attitudes	Airaj (2024); Asiksoy (2024); Alfahl (2025); Mumtaz et al. (2025)	Ethical awareness, fairness, responsibility	Implicit
Student perspectives on AI ethics	Alnsour et al. (2025a); Grieve et al. (2024); Usher et al. (2025); Villarino (2024)	Academic integrity, equity, access	Limited
Faculty and staff perspectives	Malik et al. (2025); Ravi et al. (2025); Hamerman et al. (2025); Holmes et al. (2023)	Accountability, professional ethics	Partial
Academic integrity and assessment	Evangelista (2025); Gallent-Torres et al. (2023); Bannister et al. (2024a); Tong et al. (2025)	Plagiarism, authorship, assessment validity	Explicit
Institutional AI policies and guidelines	Chan (2023); An et al. (2025); Humble (2025); Spivakovsky et al. (2023)	Transparency, acceptable use	Explicit
Governance and regulatory frameworks	Jin et al. (2025); Jiang et al. (2025); Kaya-Kasikci et al. (2025); Liu et al. (2025)	Regulation, oversight, compliance	Explicit
Ethical framework development	Cherner et al. (2025); González-Fernández et al. (2025); Castelló-Sirvent et al. (2024)	Trustworthy AI principles	Explicit
AI ethics education and literacy	Kong et al. (2023); Lan et al. (2025); Wang et al. (2025)	Ethical reasoning, reflection	Embedded
Equity and Global South contexts	Muringa (2025); Valdivieso & González (2025); Villarino (2024)	Digital divide, justice	Weak
Policy–practice alignment	Erhardt et al. (2025); Isaifan & Hasna (2025); El Baradei et al. (2025)	Implementation gaps	Uneven

Table 3. Ethical Issues Addressed in AI Ethics Research in Higher Education

Ethical Issue Category	Description	Representative Studies	Policy Relevance
Privacy and data protection	Student data collection, consent, surveillance	Holmes et al. (2023); Airaj (2024); Jin et al. (2025)	High
Academic integrity	Authorship, plagiarism, assessment fairness	Evangelista (2025); Gallent-Torres et al. (2023)	High
Algorithmic bias and fairness	Discriminatory outcomes and inequity	Valdivieso & González (2025); Muringa (2025)	High
Transparency and explainability	Opacity of AI systems	Cherner et al. (2025); González-Fernández et al. (2025)	Medium
Accountability	Responsibility for AI decisions	Chan (2023); Jiang et al. (2025)	Medium
Equity and access	Unequal access to AI tools	Villarino (2024); Nazir (2025)	Medium
Autonomy and agency	Control over AI use	Usher et al. (2025); Ravi et al. (2025)	Emerging

Table 4. Institutional Responses to AI Ethics in Higher Education

Response Type	Description	Representative Studies	Level of Formalization
Formal institutional AI policies	University-wide AI governance documents	Chan (2023); Humble (2025); An et al. (2025)	High
Temporary or provisional guidelines	Interim rules for AI use	Bannister et al. (2024b); Tong et al. (2025)	Medium
Discipline-specific approaches	Localized departmental policies	Evangelista (2025); Grieve et al. (2024)	Medium
Reliance on existing integrity policies	Extension of plagiarism rules	Gallent-Torres et al. (2023)	Low
Absence of formal guidance	Ad hoc or informal practices	Villarino (2024); Muringa (2025)	Very low

Table 5 Gaps and Challenges Identified in AI Ethics Management

Gap Area	Description	Supporting Studies	Implications
Limited institutional AI governance	Few comprehensive policies	Humble (2025); Jin et al. (2025)	Ethical risk
Fragmented governance structures	Poor coordination across units	Erhardt et al. (2025)	Inconsistent practice
Low AI ethics literacy	Limited training for staff and students	Malik et al. (2025); Kong et al. (2023)	Misuse of AI
Equity-oriented policy absence	Global South underrepresented	Muringa (2025); Valdivieso & González (2025)	Widening gaps
Lack of policy evaluation	No assessment of effectiveness	Jiang et al. (2025); Isaifan & Hasna (2025)	Weak accountability

Synthesis of Findings

Overall, the synthesized findings reveal a fragmented and uneven landscape of AI ethics management in higher education. As shown in Tables 2–4, the majority of studies focus on ethical awareness, academic integrity, and stakeholder perceptions; however, only a limited subset translates these concerns into explicit, institution-wide governance mechanisms. While ethical risks such as privacy, academic integrity, and algorithmic bias are consistently identified as high-priority issues (Table 3), institutional responses remain largely reactive, provisional, or localized rather than strategic and comprehensive (Table 4). Moreover, Table 5 highlights persistent structural gaps, including limited AI governance capacity, low levels of AI ethics literacy, and weak alignment between policy formulation and practice. Notably, equity-oriented and Global South perspectives are underrepresented, suggesting that existing governance approaches risk reinforcing rather than mitigating systemic inequalities. Taken together, these patterns indicate that current AI ethics efforts in higher education are characterized more by ethical recognition than by effective governance implementation, underscoring the need for integrated, institution-level frameworks that connect ethical principles, stakeholder engagement, and enforceable policy mechanisms.

Discussion

This systematic review set out to examine how ethical challenges associated with artificial intelligence (AI) in higher education have been conceptualized, addressed, and governed in recent scholarship. The synthesis of 55 studies published between 2022 and November 2025 reveals a rapidly evolving research landscape marked by

heightened ethical sensitivity, fragmented institutional responses, and persistent governance gaps.

Mapping Findings to Research Questions

Before examining the substantive implications of these findings, it is helpful to summarize how the evidence addresses the study's guiding research questions:

RQ1 (Ethical Issues): The review reveals that privacy, data protection, academic integrity, and algorithmic bias constitute the most frequently identified ethical concerns. These issues are characterized by high visibility, immediate consequences, and direct regulatory relevance, which accounts for their prominence in institutional discourse (Holmes et al., 2023; Evangelista, 2025; Gallent-Torres et al., 2023).

RQ2 (Governance Frameworks): Institutional responses to AI ethics exhibit considerable variability, ranging from comprehensive university-wide policies (Chan, 2023; Humble, 2025) to provisional guidelines, discipline-specific approaches, and informal practices (Tong et al., 2025; Muringa, 2025). Transnational higher education contexts reveal additional complexity, as institutions operating across cultural and regulatory boundaries must navigate diverse ethical traditions and legal frameworks when developing coherent AI policies (Bannister et al., 2024). An analysis of instructor-level policies embedded in course syllabi reveals substantial variation in messaging to students about AI use, with guidelines ranging from permissive to prohibitive, often within the same institution, which contributes to student confusion and inconsistent application (Tong et al., 2025). The majority of responses remain in early-stage or exploratory phases, reflecting limited strategic integration of AI ethics into institutional governance structures.

RQ3 (Governance Gaps): Persistent gaps include limited institutional AI governance capacity, fragmented coordination across academic and administrative units, low AI ethics literacy among faculty and students, underrepresentation of equity-oriented perspectives, and absence of systematic policy evaluation mechanisms (Jin et al., 2025; Kong et al., 2023; Valdivieso & González, 2025; Jiang et al., 2025).

RQ4 (Evidence-based Recommendations): Drawing from the identified governance gaps and stakeholder needs, the review proposes targeted recommendations for institutional practice. Key priorities include establishing centralized governance structures to reduce fragmentation (Jin et al., 2025), investing in systematic AI ethics literacy programs to enhance implementation capacity (Kong et al., 2023; Malik et al., 2025), developing robust policy evaluation mechanisms (Jiang et al., 2025), and ensuring equity-oriented, context-sensitive approaches that account for institutional diversity (Muringa, 2025; Valdivieso & González, 2025). These recommendations, detailed in the Recommendations section, translate identified deficits into actionable institutional strategies.

Collectively, the findings illustrate that while ethical concerns surrounding AI are now firmly established within higher education discourse, the translation of ethical awareness into coherent, institution-wide policy and governance structures remains uneven and incomplete.

Theoretical Implications

These findings align with institutional governance theories, which emphasize that organizational responses to external pressures are shaped by concerns over legitimacy, resource dependencies, and the diffusion of normative models across institutional fields (DiMaggio & Powell, 1983; Scott, 2014). The pattern of fragmented and provisional responses observed in this review reflects institutional isomorphism in an early stage, where institutions mimic early adopters without fully internalizing governance practices, as well as the absence of clear regulatory mandates that incentivize more comprehensive approaches.

Furthermore, the concentration of ethical responsibility at the individual level, rather than within institutional structures, aligns with critiques from responsible AI scholarship, which argues that ethical AI governance requires systemic accountability mechanisms rather than relying solely on individual judgment (Floridi et al., 2018; Jobin et al., 2019). The policy-practice gap identified in several studies (Erhardt et al., 2025; Isaifan & Hasna, 2025) aligns with implementation theory perspectives, which emphasize the challenges of translating normative policies into organizational routines and behavioral change (Lipsky, 2010).

A central pattern emerging from the analysis is the predominance of studies focused on individual-level perceptions, attitudes, and ethical awareness among students and academic staff (supported by Airaj (2024); Asiksoy (2024); Alnsour et al. (2025a); Usher et al. (2025)). This emphasis reflects the immediacy with which AI technologies—particularly generative systems—have entered everyday academic practice, often ahead of institutional regulation. By foregrounding stakeholder experiences, this body of research provides valuable insight into how AI is interpreted, negotiated, and normalized within teaching and learning contexts. However, the concentration on individual perspectives also reveals a conceptual limitation: ethical responsibility is frequently framed as a matter of personal judgment or professional conduct rather than as an institutional obligation embedded within governance structures (cf. Malik et al. (2025); Ravi et al. (2025)). This tendency risks shifting the burden of ethical decision-making onto individuals while leaving systemic conditions largely unexamined.

In contrast, studies that explicitly address institutional governance, policy development, and regulatory frameworks remain comparatively scarce. Where such studies do exist, they often describe early-stage or provisional responses, suggesting that many higher education institutions are still in an exploratory phase of AI governance. This imbalance between ethical discourse and formal governance mechanisms highlights a critical tension: AI technologies are increasingly integrated into core academic functions, yet the institutional capacity to manage their ethical implications has not developed at a commensurate pace. As a result, higher education finds itself navigating ethical challenges through fragmented and often reactive approaches.

The dominance of privacy, data protection, and academic integrity within the ethical discourse (Holmes et al., 2023; Evangelista, 2025; Gallent-Torres et al., 2023) further reflects the reactive nature of current responses. These issues are apparent, immediately consequential, and closely tied to regulatory compliance, making them natural focal points for institutional concern. The prominence of academic integrity, in particular, highlights the disruptive impact of generative AI on assessment practices, authorship norms, and conceptions of legitimate

academic work. However, the literature suggests that responses to these challenges frequently rely on extending existing integrity frameworks rather than rethinking assessment and learning design in light of AI's transformative potential. This approach may offer short-term clarity but risks entrenching defensive strategies that prioritize control over pedagogical innovation.

More conceptually complex ethical issues, such as autonomy, transparency, explainability, and accountability, receive comparatively less sustained attention. The marginalization of these concerns is significant, as they relate directly to questions of power, agency, and trust within higher education institutions. AI systems increasingly shape decision-making processes that affect students and staff, yet their inner workings often remain opaque. Without explicit attention to transparency and accountability, institutions risk normalizing AI-driven processes that undermine academic autonomy and erode confidence in institutional decision-making. The uneven engagement with these ethical dimensions suggests that current governance efforts may be addressing symptoms rather than the structural transformations introduced by AI.

Institutional responses to AI ethics, as identified in this review, reveal considerable variability in scope, coherence, and formality. Some institutions have developed comprehensive AI policies that articulate ethical principles, guidelines for acceptable use, and governance responsibilities (Chan, 2023; Humble, 2025; An et al., 2025). However, many more rely on interim measures, such as discipline-specific guidelines or informal recommendations issued by teaching and learning units (Evangelista, 2025; Grieve et al., 2024; Tong et al., 2025). While such approaches allow flexibility during periods of technological uncertainty, they also create fragmented governance environments in which ethical standards vary across departments and programs. This fragmentation complicates implementation, weakens accountability, and may lead to inconsistent experiences for students and staff.

The dispersion of governance responsibilities across multiple institutional actors further exacerbates these challenges. Ethics committees, academic boards, data protection offices, and teaching support units often operate in parallel, with limited coordination or shared oversight. In such contexts, AI ethics governance becomes diffused rather than centralized, reducing institutional capacity to respond systematically to emerging risks. The literature reviewed here suggests that without clearly defined roles and integrative governance structures, ethical oversight of AI use remains vulnerable to gaps, overlaps, and ambiguities.

A particularly salient finding concerns the role of AI ethics literacy as a mediating factor in effective governance. Several studies highlight that limited understanding of AI systems among faculty and students constrains the practical impact of policies and guidelines. Even well-articulated ethical frameworks may fail to influence practice if stakeholders lack the conceptual tools needed to interpret and apply them. This insight highlights the interdependence of governance and education: effective ethical AI management necessitates not only policies and regulations but also sustained investment in professional development and curricular integration. Ethics, in this sense, becomes not merely a regulatory concern but a pedagogical one.

The review also reveals significant equity-related blind spots within the current literature. While issues of fairness

and bias are frequently acknowledged, fewer studies engage deeply with structural inequalities across institutional and national contexts. Research from under-resourced institutions and Global South settings highlights how uneven access to AI tools, infrastructure, and training may exacerbate existing educational disparities. However, these perspectives remain underrepresented in policy-oriented discussions, which often implicitly assume resource-rich environments. This imbalance raises concerns about the universality of proposed governance frameworks and highlights the need for context-sensitive approaches that take into account institutional diversity.

Another notable gap concerns the evaluation of AI ethics policies and governance mechanisms. Few studies provide empirical evidence regarding the effectiveness of existing policies or examine how ethical guidelines influence practice over time. This absence of evaluative research limits the field's capacity to move beyond normative recommendations toward evidence-based governance. Without systematic assessment, institutions risk adopting symbolic or performative policies that signal ethical commitment without producing meaningful change. The development of robust evaluation mechanisms thus emerges as a critical frontier for future research and institutional practice.

Taken together, the findings of this review suggest that AI ethics in higher education is characterized by a growing recognition of ethical risk, coupled with fragmented and uneven governance responses (supported by the patterns identified across (Humble, 2025; Jin et al., 2025; Erhardt et al., 2025; Muringa, 2025). Ethical awareness has expanded rapidly, particularly among individual actors, yet institutional structures have struggled to keep pace with the scale and speed of technological change. Addressing this misalignment requires a shift from ad hoc, reactive measures toward comprehensive and integrated governance frameworks that embed ethical considerations into the core missions of teaching, learning, research, and administration.

Such a shift entails reconceptualizing AI ethics not as a peripheral compliance issue but as a foundational component of institutional strategy. Effective AI ethics management must integrate ethical principles, governance structures, stakeholder education, and continuous evaluation within a coherent framework. Only through such an approach can higher education institutions navigate the ethical complexities of AI in ways that uphold academic values, promote equity, and support sustainable innovation.

Alternative Perspectives and Counter-Arguments

It is important to acknowledge alternative interpretations of the findings. The prevalence of provisional and fragmented governance approaches may not solely reflect institutional inadequacy; it could also represent a deliberate strategy of cautious adaptation in the face of technological uncertainty. Some scholars argue that premature formalization of AI policies may constrain innovation and pedagogical experimentation, particularly when the long-term implications of AI technologies remain unclear (Selwyn, 2019; Williamson & Eynon, 2020). From this perspective, provisional guidelines offer valuable flexibility, allowing institutions to learn from experience and adjust policies iteratively rather than locking in approaches that may prove inappropriate as AI capabilities evolve.

Similarly, the fragmentation of governance across departments and disciplines may not be entirely harmful. Discipline-specific approaches can enable contextually appropriate responses that reflect the distinct ethical considerations arising in different fields—for example, the specific challenges of AI use in healthcare education versus humanities disciplines (Grieve et al., 2024; Evangelista, 2025). A degree of decentralization may also preserve the academic autonomy valued in higher education traditions. Nevertheless, the evidence suggests that without some coordination mechanism, fragmentation risks producing inconsistent standards and inequitable experiences for students across the same institution.

Methodological Limitations

Several methodological limitations should be acknowledged when interpreting these findings. First, the majority of included studies rely on self-reported data from surveys and interviews, which may be subject to social desirability bias and may not accurately reflect actual practices. Second, there is a notable predominance of studies from Anglo-Saxon and Western contexts (primarily the United States, United Kingdom, Australia, and Europe), which limits the generalizability of findings to other institutional and cultural contexts. Third, many policy-oriented studies analyze normative documents rather than examining implementation outcomes, leaving questions about the practical effectiveness of stated policies largely unanswered. Finally, the rapid evolution of AI technologies and the relative novelty of the research field mean that the evidence base remains limited, and longitudinal studies examining the durability and effectiveness of governance approaches are largely absent.

Contributions of This Study

This review makes three primary contributions to the literature. First, it provides a conceptual contribution by offering a comprehensive synthesis of the ethical issues associated with AI in higher education, clarifying the conceptual landscape and identifying which concerns have received sustained attention and which remain underexplored. The analysis highlights the distinction between immediate, high-visibility ethical issues such as privacy and academic integrity, and more structurally significant but less frequently addressed concerns, including autonomy, transparency, and accountability.

Second, the study offers a governance and policy contribution by systematically mapping institutional responses to AI ethics. This review presents a typology of governance approaches—ranging from comprehensive policies to provisional guidelines to informal practices—that can inform institutional self-assessment and policy development. The identification of persistent governance gaps provides a diagnostic framework for institutions seeking to strengthen their AI ethics management.

Third, the review makes a significant contribution to the research agenda by identifying critical directions for future research. These include the need for evaluative studies examining policy effectiveness. These interdisciplinary approaches integrate educational, legal, and organizational perspectives, as well as context-sensitive research that attends to equity concerns and perspectives from the Global South.

Conclusion

The rapid diffusion of artificial intelligence across higher education has fundamentally altered how teaching, learning, assessment, and academic governance are conceptualized and enacted. This systematic review demonstrates that, while ethical concerns surrounding AI are now firmly embedded in scholarly and institutional discourse, higher education has yet to develop governance frameworks that are sufficiently comprehensive, coherent, and context-sensitive to manage these challenges effectively. The findings suggest that ethical awareness has expanded more rapidly than institutional capacity, creating a persistent gap between technological adoption and ethical oversight.

By synthesizing evidence from 55 studies published between 2022 and November 2025, this review provides a structured understanding of the ethical issues, governance responses, and systemic gaps that shape AI integration in higher education. The literature reveals a strong focus on immediate and visible concerns—particularly privacy, data protection, and academic integrity—while more complex ethical dimensions such as autonomy, transparency, accountability, and equity remain underdeveloped in policy and practice. This imbalance reflects a broader tendency toward reactive governance, in which institutions respond to emerging risks without fully addressing the structural transformations introduced by AI technologies.

Notably, the review highlights that ethical AI management cannot be reduced to policy formulation alone. Effective governance requires alignment among ethical principles, institutional structures, stakeholder competencies, and evaluative mechanisms. Fragmented and provisional approaches, although understandable in periods of rapid technological change, risk producing inconsistent standards and uneven protection for students and staff. In contrast, integrated frameworks that embed ethics into institutional strategy offer greater potential for sustaining both innovation and academic values.

The findings also underscore the need to situate AI ethics governance within the diverse realities of higher education systems worldwide. Variations in institutional resources, digital infrastructure, and regulatory environments shape both the risks and opportunities associated with AI use. Without deliberate attention to equity and contextual adaptation, AI governance frameworks may inadvertently reinforce existing inequalities rather than mitigate them. Future efforts must therefore move beyond universalistic policy templates toward flexible models that can be meaningfully adapted across contexts.

From a research perspective, this review identifies several directions for advancing the field. Greater emphasis is needed on evaluative and longitudinal studies that examine how AI ethics policies function in practice and evolve over time. Similarly, interdisciplinary approaches that integrate educational theory, ethics, law, and organizational studies are essential for capturing the full complexity of AI governance in higher education. Such work will be critical for moving the field from normative debate toward evidence-based institutional action.

In conclusion, managing AI ethics in higher education represents not a temporary challenge but a defining task for contemporary academic institutions. As AI technologies continue to reshape educational practices, the

development of robust, inclusive, and adaptive ethical governance frameworks will be central to safeguarding academic integrity, promoting equity, and sustaining trust in higher education. This review provides a foundation for such efforts by clarifying current knowledge, exposing critical gaps, and offering a roadmap for future research and policy development in this rapidly evolving domain.

Recommendations

Based on the synthesis of current literature, higher education institutions are encouraged to adopt comprehensive, integrated AI ethics frameworks that align ethical principles with governance structures, stakeholder education, and continuous evaluation. Policies should explicitly address privacy, data protection, academic integrity, transparency, and equity, while remaining adaptable to diverse institutional contexts and resource capacities. Investments in faculty and student AI literacy, combined with interdisciplinary oversight mechanisms, can enhance the responsible adoption of AI and foster trust. Furthermore, institutions should systematically evaluate the effectiveness of policies and guidelines over time, ensuring that AI integration supports pedagogical innovation, upholds academic values, and mitigates unintended ethical and social consequences.

Author(s)' Statements on Ethics and Conflict of Interest

***Ethics Statement*:** As this study involved secondary analysis of published literature, formal ethical approval was not required. All included studies were properly cited and used in accordance with copyright and fair use principles.

***Statement of Interest*:** We have no conflict of interest to declare.

Data Availability Statement: Data are available on reasonable request from the authors.

Author Contributions: All authors contributed to the study's conception and design. **İsmail Kaşarcı** was responsible for data collection, formal analysis, and drafting the manuscript. **Zeynep Akın Demircan, Gülçin Çeliker Ercan and Tuğba İnci** contributed to the methodology, interpretation of results, and critical revision of the manuscript. All authors read and approved the final manuscript.

***Funding*:** None

***Acknowledgments*:** None

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