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**Editorial Note – TOJNED January 2026 Issue**

Contemporary education systems are undergoing a profound transformation shaped by digitalization, artificial intelligence, quality assurance frameworks, inclusive education paradigms, ethical responsibility, and evidence-based governance. In this rapidly evolving context, quality in education can no longer be understood solely as a managerial or procedural concern; rather, it must be conceptualized as a multidimensional construct encompassing teaching and learning processes, assessment practices, leadership models, technological integration, and social responsibility.

**The Online Journal of New Horizons in Education (TOJNED)** continues to provide an international and interdisciplinary platform for scholarly work that critically examines emerging challenges and innovations in education. **Volume 16, Issue 1 (January 2026)** brings together a diverse collection of rigorously reviewed studies that collectively address the intersections of quality assurance, artificial intelligence, educational management, inclusive and special education, media and society, ethics, and leadership.

This issue opens with a focus on quality assurance in special education. In the article "*Assessment Of Educational Quality In Special Education: New Indicators And Monitoring Mechanisms For Inclusive Schools*" ***Turkan Gurbanova Gurban*** concludes that inclusive schools benefit from adaptive monitoring systems that emphasize continuous improvement, stakeholder participation, and data-informed decision-making.

The growing impact of artificial intelligence on quality assurance and governance in higher education is addressed in several contributions. **Ahmet Adalier, Damla Karagozlu, Kian Jazayeri, and Japheth Ahmed Nuhu**, in their study *"Knowledge Mapping of Artificial Intelligence for Quality Assurance and Accreditation in Higher Education: A Bibliometric Analysis (2015–2025),"* provide a comprehensive mapping of global research trends, offering valuable insights into how AI-driven approaches are reshaping accreditation and quality evaluation processes. Complementing this perspective, **Hüseyin Gökal** explores *"Artificial Intelligence–Based Approaches to Strengthen Quality in E-Learning Environments,"* highlighting the potential of intelligent systems to enhance learning quality, personalization, and monitoring mechanisms in digital education.

Quality management and institutional perspectives in higher education are further elaborated through conceptual and case-based analyses. **Ayşegül Tümer**, in *"Quality Management and Quality Assurance in Higher Education,"* presents a systematic discussion of quality frameworks, emphasizing sustainability, continuous improvement, and accountability. In a complementary institutional case study, **Bayim Nabiyeva** offers *"Quality Assurance in Higher Education: Insights from Azerbaijan State Pedagogical University,"* illustrating how quality assurance mechanisms are operationalized within a national and institutional context.

Organizational values, ethics, and leadership emerge as critical dimensions of quality culture in education. **Buket Karatop, Adem Akcakaya, Kübra Zayim Gedik, Mehmet Kosem, and Yasemin Kirmanli**, in their article *"Difference of Principles and Values within the Organization: An Artificial Intelligence–Supported Mind Map Model,"* propose an innovative AI-supported model to analyze value differences within organizations. Ethical considerations are further explored by **Sevilay Atmaca and Özlenen Özdiyar-Gedik** in *"Ecological Solutions to Ethical Dilemmas,"* which addresses sustainability-oriented ethical frameworks relevant to educational and organizational decision-making. Leadership practices are examined

 

by **Taleh Mirzayev** in *"Authentic and Transformational Leadership in Educational Management: A Comparative Review and Synthesis,"* offering a theoretical synthesis that underscores leadership as a foundational element of educational quality.

The issue also addresses the social dimensions of technology and education. **Emel Yılmaz**, in *"Media Representation and Public Reactions to AI-Based Traffic Cameras: The Case of Northern Cyprus,"* analyzes media discourse and public perception, contributing to broader discussions on technology, governance, and societal trust. **Galib Sharifov**, through *"Turning Numbers into Quality: A Learning Analytics-Based Academic Staff Evaluation Model in Higher Education,"* demonstrates how data-driven evaluation models can support transparent and meaningful quality enhancement processes.

Inclusive and special education constitute another major thematic strand of this issue. **Gunay Badalzade**, in *"Enhancing Learning for Students with Down Syndrome through Assistive Technologies,"* highlights the transformative potential of assistive tools in promoting educational equity. Similarly, **Turkan Gurbanova Gurban**, in *"Assessment of Educational Quality in Special Education: New Indicators and Monitoring Mechanisms for Inclusive Schools,"* proposes innovative indicators and monitoring approaches to strengthen quality assurance in inclusive educational settings. Addressing education in contexts of vulnerability, **Münevver Mertoğlu**, in *"Impacts of War on Children and Adolescents,"* draws attention to the long-term educational and psychosocial consequences of conflict, emphasizing the ethical and social responsibilities of education systems. And An overarching and integrative perspective on systemic transformation in education is offered by **Prof. Dr. Mehmet Çağlar** in his article *"21st-Century Competencies in the Age of Artificial Intelligence: Reconstructing Education Systems in the Context of Global Transformations."* This study critically examines how artificial intelligence, digitalization, and global socio-economic shifts are redefining the knowledge, skills, and values required of learners in the 21st century.

Collectively, the articles in this issue reflect TOJNED's commitment to advancing high-quality, ethical, and impactful research that responds to both global trends and local educational contexts. Each contribution underscores the necessity of evidence-based, inclusive, and forward-looking approaches to quality in education.

We extend our sincere appreciation to all authors for their valuable scholarly contributions, to our reviewers for their rigorous and constructive evaluations, and to the editorial board for their dedication to maintaining the highest academic standards. We hope that **Volume 16, Issue 1** will inspire further research, dialogue, and innovation in the pursuit of quality and excellence in education.

**Prof. Dr. Aytekin İşman**
**Editor-in-Chief**
**The Online Journal of New Horizons in Education (TOJNED)**
**January 01, 2026**

 

 

## Editorial Board



 

 

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# 21ST-CENTURY COMPETENCIES IN THE AGE OF ARTIFICIAL INTELLIGENCE: RECONSTRUCTING EDUCATION SYSTEMS IN THE CONTEXT OF GLOBAL TRANSFORMATIONS

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**ABSTRACT**
The rapid technological, economic, and social transformations of the twenty-first century have fundamentally reshaped the competencies required of individuals in education and working life. In particular, the widespread adoption of artificial intelligence technologies has made it necessary to reconsider the goals and structures of education systems. In an era where access to information is increasingly effortless, the primary function of education has shifted from knowledge transmission to fostering individuals who can adapt to change, think critically, and engage in lifelong learning.
The purpose of this study is to examine key twenty-first-century competencies in the age of artificial intelligence and to discuss the role of education systems in developing these competencies. The study draws on recent reports published by the World Economic Forum, the OECD, and the European Union, as well as contemporary international academic literature. Competency is conceptualized as a holistic construct encompassing knowledge, skills, attitudes, and values. The findings indicate that traditional knowledge-based educational models are insufficient in today's rapidly changing environment. Instead, competencies such as adaptive thinking, problem solving, creativity, ethical judgment, and the ability to formulate meaningful questions are becoming increasingly critical. While artificial intelligence enhances efficiency in information processing, human capacity for interpretation, contextual reasoning, and value-based decision-making remains essential. The study concludes that education systems must be restructured around competency-based approaches to effectively prepare individuals for an uncertain and evolving future.

**Keywords:** 21st-century competencies, artificial intelligence, education systems, competency-based education, adaptive thinking

## 1. INTRODUCTION

The twenty-first century stands out in human history as a period characterized by simultaneous and unprecedented technological, economic, and social transformations. Digitalization, artificial intelligence, globalization, climate change, and demographic shifts are profoundly reshaping individuals' lifestyles, work practices, and expectations of education. This multidimensional transformation process redefines not only the nature of occupations but also the sets of knowledge, skills, and competencies expected from individuals (Schwab, 2016; World Economic Forum, 2023).

The rapid growth in knowledge production and access has called into question traditional assumptions about the fundamental function of education. Unlike previous eras, knowledge is no longer a scarce or privileged resource; rather, it is easily accessible, constantly updated, and quickly becomes obsolete. This situation highlights that the primary aim of education should no longer be the transmission of information, but teaching how knowledge can be used, interpreted, and adapted to new situations. The OECD (2021) describes this shift as a necessary transition from knowledge-based education to competency-based education.

The rapid development of artificial intelligence technologies has further intensified debates about the role of humans in education. AI systems can perform highly in areas such as data analysis, pattern recognition, and prediction; however, they still rely on human intelligence for problem definition, contextual interpretation, and ethical reasoning (Luckin et al., 2016; OECD, 2021). In this context, the literature emphasizes that the distinguishing feature of humans vis-à-vis artificial intelligence lies in their capacity to ask the right questions, create meaning, and make value-based decisions.

These developments necessitate a re-examination of the concept of competency. In classical approaches, competency was defined as an integrated set of knowledge, skills, and personal characteristics enabling effective performance

  

(Spencer & Spencer, 1993). Contemporary literature broadens this definition, conceptualizing competency as a holistic and dynamic structure encompassing not only cognitive knowledge and technical skills but also attitudes, values, ethical awareness, and adaptability to changing conditions (Mulder, 2017; OECD, 2019). This perspective is particularly important for enabling education systems to prepare individuals for unpredictable future conditions.

The literature on twenty-first-century competencies highlights higher-order competencies such as adaptive thinking, critical inquiry, creativity, collaboration, problem solving, and lifelong learning. Recent reports by the World Economic Forum indicate that individuals will change professions multiple times throughout their careers and that learning agility, flexibility, and adaptability—rather than technical knowledge alone—will be decisive (World Economic Forum, 2023). Consequently, education systems must evolve from structures that merely prepare individuals for specific occupations into dynamic systems that prepare them for lifelong learning.

This study aims to discuss which competencies education systems should develop in the age of artificial intelligence and how these competencies can be fostered. Drawing on competency frameworks proposed by the World Economic Forum, the OECD, and the European Union, the study examines the transition from knowledge-based education to competency-based approaches. Based on findings obtained through literature review and document analysis, the study discusses the areas of transformation required for education systems to adapt to the future from a holistic perspective.

## 2. LITERATURE REVIEW

This section systematically reviews contemporary literature to understand the transformation of education systems in the age of artificial intelligence. The review aims to address the key dynamics shaping education in the twenty-first century, the theoretical foundations of competency-based approaches, and the impact of artificial intelligence technologies on human competencies within an integrated framework. Accordingly, global megatrends influencing education systems are first discussed, followed by an examination of the pedagogical and theoretical dimensions of competency-based education. The relationship between artificial intelligence and human competencies is then explored, and finally, competency frameworks developed by the World Economic Forum are critically evaluated in terms of their implications for education systems.

### 2.1. Global Megatrends and Education Systems

Global transformations directly affect the structure and function of education systems. In the literature, these transformations are often discussed under the concept of "megatrends," referring to long-term, structural changes. Megatrends encompass multidimensional processes such as technological developments, demographic shifts, changes in economic power balances, environmental crises, and social transformations (Schwab, 2016; Voros, 2017). These trends reshape not only labor markets but also individuals' learning needs and expectations from education.

Technological developments—particularly digitalization and the widespread use of artificial intelligence—are considered among the most influential megatrends affecting education systems. AI-supported systems accelerate access to information and offer the potential to personalize learning processes. However, the literature emphasizes that technological progress alone does not guarantee improvements in educational quality and may yield superficial outcomes unless supported by pedagogical transformation (Selwyn, 2019). Thus, educational technologies are viewed as means rather than ends, underscoring the importance of a human-centered learning approach.

The relationship between technological transformation and education is not merely instrumental. Castells (2010) argues that with the rise of the network society, the modes of knowledge production and circulation have fundamentally changed, inevitably transforming education systems. As knowledge shifts from linear and hierarchical structures to network-based ones, learning must become more open, interactive, and multidimensional. Accordingly, education systems should position students not as passive recipients of knowledge but as active producers of knowledge.

Demographic changes also exert significant pressure on education systems. Population aging, increased migration, and generational differences intensify the need for flexibility and inclusivity in education. New generations growing up immersed in digital technologies demand greater autonomy, meaning, and flexibility in learning processes. The learning styles of these "digital natives," as termed by Prensky (2001), increasingly conflict with traditional instructional models, compelling education systems to rethink their pedagogical approaches.

  

From an economic perspective, intensified global competition and rapidly transforming labor markets are key megatrends. Brown, Lauder, and Ashton (2011) argue that the knowledge economy does not automatically provide better employment opportunities; instead, it intensifies competition over qualifications. This situation highlights that education systems should aim not only to enhance employability but also to develop individuals' long-term adaptability. Contemporary studies indicate that individuals will change professions multiple times during their careers, often requiring educational support during these transitions (World Economic Forum, 2023).

Environmental crises and climate change constitute another megatrend gaining central importance in education. Sterling (2010) conceptualizes the sustainability crisis not only as an environmental issue but also as an epistemological one, arguing that education systems must transform the ways in which the world is perceived and understood. In this context, education assumes the role of fostering systems thinking, ethical responsibility, and global citizenship, beyond merely raising environmental awareness (UNESCO, 2020).

A key point emphasized in the literature is that these megatrends are interrelated rather than independent. Technological developments reshape economic structures, economic pressures may exacerbate social inequalities, and these inequalities can generate new challenges in access to education (Piketty, 2020). Within this complex landscape, the role of education systems is defined not merely as adapting to existing conditions, but as equipping individuals with the cognitive and affective capacities to cope with uncertainty, complexity, and rapid change (OECD, 2021).

In sum, the literature demonstrates strong consensus that global megatrends compel education systems to undergo profound transformation. This transformation requires moving away from content-driven and standardized approaches toward models centered on flexibility, adaptation, critical thinking, and lifelong learning. Accordingly, the primary goal of education systems should not be to prepare individuals for specific occupations, but to equip them with competencies that enable adaptation to change itself.

**2.2. Competency-Based Education Approaches**

The transformative impact of global megatrends on education systems has prompted a shift away from content- and knowledge-transfer-centered approaches. In this context, competency-based education approaches are considered among the core paradigms shaping educational reforms in the twenty-first century. The literature defines competency-based education as an approach aimed not merely at acquiring knowledge, but at developing the capacity to apply, transform, and adapt knowledge across diverse contexts (Mulder, 2017).

The emergence of competency-based education is closely linked to the need to rethink the relationship between education systems and labor markets. Traditional education models largely focused on discipline-based knowledge transmission, a model increasingly perceived as inadequate in the face of rapidly changing social and economic conditions. As transferable skills and higher-order cognitive competencies gain importance, the question of "how learning occurs" has become as central as "what is taught" (Hattie, 2012).

There is broad consensus in the literature that competency is a multidimensional construct. While Spencer and Spencer (1993) conceptualized competency as a combination of characteristics enabling superior performance, contemporary approaches expand this definition to include knowledge, skills, attitudes, and values as an integrated whole (OECD, 2019; Mulder, 2017). This expanded perspective highlights that competencies are not limited to measurable outputs but are also linked to individuals' ways of thinking, value systems, and attitudes toward learning.

A key characteristic of competency-based education is its emphasis on learning processes rather than solely on outcomes. Learning is viewed not as a time-bound activity, but as a lifelong, dynamic developmental process. The OECD Learning Compass 2030 framework structures this perspective around the concept of lifelong learning, identifying the development of competencies for coping with uncertainty, complexity, and change as a central goal (OECD, 2019).

Pedagogically, competency-based approaches require a redefinition of teacher and student roles. In traditional teacher-centered models, educators function primarily as transmitters of knowledge; in competency-based models, they act as facilitators, guides, and providers of feedback. Students, in turn, shift from passive recipients of information to active learners who inquire, construct, and produce knowledge (Biesta, 2015). This transformation necessitates more interactive, collaborative, and problem-based learning environments.

Another critical dimension of competency-based education concerns assessment. While traditional assessment relies heavily on knowledge recall through examinations, competency-based models emphasize performance-, process-, and

  

context-oriented assessment tools. Portfolios, project-based work, self-assessment, and peer assessment enable more holistic monitoring of competency development (Boud & Falchikov, 2007).

The literature also includes critical perspectives on competency-based education. Some scholars argue that this approach risks excessive measurement and standardization, potentially marginalizing the humanistic and ethical dimensions of education (Biesta, 2010). Such critiques caution against reducing competencies to technical skill lists, emphasizing instead that competencies cannot be separated from values, ethical responsibility, and social context (UNESCO, 2020).

In conclusion, the literature indicates that competency-based education offers a strong alternative in addressing the complexity and uncertainty of the twenty-first century. However, its effectiveness depends on conceptualizing competencies not as narrow performance metrics but as dynamic structures supporting holistic human development. Accordingly, education systems must be designed with sufficient flexibility to prepare individuals not only for present challenges but also for problems yet to be defined.

**2.3. Artificial Intelligence, Human Competencies, and Education**

The rapid advancement of artificial intelligence technologies has reignited theoretical and practical debates about the role of humans in education. Machine learning, big data analytics, and generative AI applications increasingly demonstrate human-level or even superior performance in information access, content generation, and problem solving. These developments necessitate a redefinition of the fundamental goals of education and the competencies it seeks to cultivate.

The literature generally approaches the impact of AI on education through two main perspectives. The first views AI as a threat capable of replacing human labor, while the second considers AI as a tool that complements and augments human competencies (Autor, 2015; Brynjolfsson & McAfee, 2017). Contemporary research suggests that the latter perspective is more realistic and sustainable. The key issue is not whether AI will replace humans, but how human–AI collaboration will be structured.

AI systems offer significant advantages in data-intensive tasks due to their computational speed and capacity. However, they face limitations in defining problem goals, prioritizing values, and engaging in contextual meaning-making. In these areas, human competencies remain decisive. The education literature emphasizes that competencies such as critical thinking, creative problem solving, ethical reasoning, and contextual awareness are difficult to substitute with AI (OECD, 2021; Floridi et al., 2018).

Within this context, the ability to ask questions emerges as a central human competency in the age of AI. AI systems generate meaningful outputs only to the extent that they are prompted with well-formulated questions. Thus, the capacity to ask deep, critical, and purposeful questions becomes a prerequisite for effectively leveraging AI. The literature interprets this shift as a transition in education from an “answer-producing” orientation to a “question-generating” one (Fullan & Langworthy, 2014).

Another key concept highlighted in the AI era is adaptive thinking. Adaptive thinking refers to the ability to respond flexibly to changing conditions by reorganizing existing knowledge and experience. This competency underpins effective decision-making in environments characterized by uncertainty and complexity. Educational research indicates that adaptive thinking encompasses not only cognitive but also affective and ethical dimensions (Hatano & Inagaki, 1986; OECD, 2019).

AI also holds potential for personalizing learning processes. AI-supported learning analytics can analyze learners’ pace, preferences, and strengths to offer personalized learning experiences. However, the literature cautions that without alignment with pedagogical goals, such technologies may increase the risk of superficial learning (Selwyn, 2019). Therefore, AI use in education must be guided by pedagogical principles and ethical frameworks.

Ethical considerations are critical in discussions of AI and education. Issues such as algorithmic bias, data privacy, and accountability constitute major concerns. Floridi et al. (2018) argue that AI systems not designed in accordance with ethical principles risk deepening social inequalities. Consequently, education systems should equip individuals not only with the ability to use AI but also with the competency to critically and ethically evaluate these technologies.

  

In summary, the literature underscores that the primary aim of education in the age of AI should not be to adapt humans to technology, but to strengthen distinctly human competencies. While AI facilitates access to and processing of information, humans remain central in meaning-making, value-based judgment, and holistic problem solving. Education systems must therefore be restructured around a competency framework that emphasizes the complementary relationship between humans and AI.

### 2.4. World Economic Forum Competency Frameworks and Critical Evaluation

One of the most influential efforts to systematically define emerging competencies in the twenty-first century is the series of "Future of Jobs" reports published by the World Economic Forum. These reports analyze global labor market transformations to identify key competency domains expected of individuals in the future workforce. A review of these reports reveals that while technical skills retain importance, cognitive, social, and emotional competencies have become increasingly central (World Economic Forum, 2018; 2020; 2023).

The World Economic Forum's competency frameworks highlight critical thinking, problem solving, creativity, learning agility, and emotional intelligence as distinguishing features of the future workforce. These frameworks indicate that education systems must move beyond merely imparting vocational knowledge and technical skills to become holistic systems that prepare individuals for uncertainty, complexity, and rapid change. This perspective aligns closely with discussions of global megatrends and competency-based education presented earlier.

However, the literature also offers critical evaluations of the World Economic Forum's frameworks. Some scholars argue that these reports are primarily driven by business perspectives and insufficiently address the social, ethical, and cultural dimensions of education (Biesta, 2010; Young, 2013). Such critiques caution that framing competencies solely in terms of economic productivity and employability may overshadow education's public and humanistic functions.

The risk of reducing competencies to narrow economic interpretations constitutes a major debate in education. In contrast, the OECD Learning Compass 2030 framework broadens the discussion by integrating individual well-being, social responsibility, and sustainability into competency discourse (OECD, 2019). This approach reinforces the notion that competencies should contribute not only to labor market adaptation but also to meaningful and responsible living.

A strength of the World Economic Forum's reports lies in their treatment of competencies as dynamic rather than static constructs. The changing prominence of different skills over time illustrates the need for continuous updating in education. However, this dynamism also presents significant challenges for education systems, raising questions about how curricula can respond effectively to rapid change (Rosenberg, 2020).

Another debated issue concerns the assessment of competencies. Many competencies identified by the World Economic Forum—such as creativity, critical thinking, and adaptive learning—are inherently abstract and context-dependent, making them difficult to measure using standardized tools. This difficulty raises the risk of superficial implementation of competency-based approaches (Allais, 2014).

Overall, the literature suggests that while the World Economic Forum's competency frameworks provide valuable reference points for education policy, they should not be treated as prescriptive solutions. Instead, they must be interpreted critically, in conjunction with pedagogical, ethical, and social considerations, and adapted to cultural contexts. The future of education depends not only on which competencies are developed, but also on the values and pedagogical principles guiding their development.

## 3. METHODOLOGY

This study was designed as a qualitative inquiry aimed at examining the transformation of education systems in the age of artificial intelligence and identifying prominent twenty-first-century competencies. Rather than employing quantitative measurement or experimental designs, the study utilized literature review and document analysis methods, enabling in-depth conceptual analysis. A qualitative research approach was deemed appropriate given its capacity to address complex and multidimensional educational phenomena within their contexts (Creswell, 2013).

### 3.1. Research Design

The study is based on a descriptive and interpretive qualitative research design. Qualitative research focuses on understanding the meaning-making processes of individuals, institutions, and systems, enabling in-depth exploration

  

beyond numerical measurement (Creswell & Poth, 2018). Given the abstract and multifaceted nature of concepts such as artificial intelligence, competency, and education, a qualitative design provides an appropriate framework.

In the first phase, contemporary academic studies on artificial intelligence, twenty-first-century competencies, and the transformation of education systems were systematically reviewed. Peer-reviewed journal articles, books, and academic reports—particularly those published within the last decade—were prioritized.

The literature review was conducted as an analytical process, not merely summarizing existing studies but comparing theoretical perspectives and identifying common themes and debates. This approach strengthened the study's theoretical framework and facilitated contextual positioning of the research problem (Webster & Watson, 2002).

### 3.2. Document Analysis and Data Analysis

In the second phase, policy documents and reports published by international organizations were analyzed using document analysis. This method involves systematic examination of written materials to extract meanings relevant to research questions (Bowen, 2009). Reports from the World Economic Forum, OECD, UNESCO, and the European Union were examined.

Data were analyzed using descriptive and thematic analysis approaches. Key concepts and themes were identified and interpreted by comparing findings from document analysis with those from the literature review. Thematic analysis was selected for its capacity to systematically reveal patterns of meaning in qualitative data (Braun & Clarke, 2006).

As the study did not involve human participants, ethical committee approval was not required. Nevertheless, all sources were properly cited, and academic ethical standards were strictly observed.

## 4. FINDINGS AND DISCUSSION

In this section, the findings obtained through the literature review and document analysis are presented, and these findings are discussed in the context of the transformation of education systems in the age of artificial intelligence. The findings are structured around the nature of the competencies that have come to the fore in the twenty-first century, how these competencies are addressed by education systems, and the role of artificial intelligence technologies in this process.

### 4.1. Transition from Knowledge-Based Education to Competency-Based Education

The research findings reveal that the traditional knowledge-based understanding of education has become increasingly inadequate under the conditions of the twenty-first century. In the literature, the accelerating pace of knowledge production and the rapid obsolescence of knowledge clearly demonstrate that education cannot be sustained through a structure based solely on the transmission of information. This finding is consistent with the paradigm-shift necessity emphasized in the reports of the OECD (2019; 2021) and the World Economic Forum (2023).

The findings indicate that education systems are increasingly moving toward competency-based approaches. Competency-based education aims to develop individuals' capacity not merely to memorize discrete pieces of information, but to use such knowledge across different contexts, adapt it to new situations, and apply it effectively in problem-solving processes. This illustrates that the performance-based competency understanding defined by Spencer and Spencer (1993) has evolved into a more holistic framework in contemporary literature (Mulder, 2017; OECD, 2019).

The findings further demonstrate that conceptualizing competency as an integrated structure of knowledge, skills, attitudes, and values has become decisive for education systems. This approach necessitates focusing not only on cognitive outcomes in education, but also on individuals' attitudes toward learning, ethical awareness, and sense of social responsibility. Studies reporting similar findings in the literature show that competency-based approaches enhance individuals' capacity to cope with uncertainty (Biesta, 2015; OECD, 2021).

In this context, the research findings indicate that the transition from a knowledge-based educational understanding to a competency-based approach is not merely a pedagogical preference, but a structural necessity. If education systems fail to realize this transformation, it is anticipated that individuals will experience serious difficulties in adapting to rapidly changing social and economic conditions.

  

### 4.2. The Central Role of Adaptive Thinking and Lifelong Learning Competencies

Another significant finding of the study is that adaptive thinking and lifelong learning competencies have risen to a critical position in the twenty-first century. In the literature, adaptive thinking is defined as an individual's ability to rapidly adapt to changing conditions and to reorganize and apply existing knowledge and experiences to new situations (Hatano & Inagaki, 1986; OECD, 2019). The findings indicate that this competency has become one of the primary goals of education systems, particularly in the context of artificial intelligence and digital transformation.

The reports analyzed within the scope of document analysis demonstrate that individuals will change occupations many times throughout their careers and that these transitions can only be managed through the capacity for continuous learning. The World Economic Forum (2023) defines learning agility as a distinguishing competency in the future workforce. This finding shows that adaptive thinking is not merely an individual skill, but also an educational outcome that must be developed systematically.

The literature emphasizes that adaptive thinking is closely associated with effective decision-making in environments characterized by uncertainty and complexity. In this context, it is noted that education systems should design learning environments that expose students not to predictable and standardized problems, but to open-ended and multidimensional challenges (Fullan & Langworthy, 2014). The research findings show that problem-based learning, project-based work, and interdisciplinary approaches are pedagogical tools that support adaptive thinking.

The competency of continuous learning stands out as a complementary element of adaptive thinking. The findings indicate that treating learning as a process limited to a specific educational period has lost its validity under current conditions. The OECD Learning Compass 2030 framework defines the development of individuals' capacity to learn how to learn as one of the fundamental goals of education systems (OECD, 2019). This approach suggests that education systems should not only provide individuals with knowledge, but also equip them with the ability to manage learning processes.

These findings directly align with the "ability to evolve" emphasized in your presentations. Adaptive thinking and continuous learning emerge as fundamental competencies that enable individuals to be prepared not only for today's conditions but also for future circumstances that have not yet been defined.

### 4.3. Question-Asking Skills and Human–Artificial Intelligence Collaboration in the Age of AI

The research findings reveal that one of the fundamental competencies distinguishing humans from technology in the age of artificial intelligence is the ability to ask questions. AI systems can generate rapid and effective outputs using large datasets; however, these outputs are directly related to the quality of the questions posed to them. This indicates that education must evolve from a structure focused solely on teaching correct answers to one that cultivates individuals capable of producing meaningful and deep questions.

In the literature, the skill of asking questions is emphasized as being closely related to critical thinking and creative problem solving. Chin and Osborne (2008) note that high-quality questions increase conceptual depth in learning processes and enable individuals to construct knowledge actively rather than consuming it passively. The research findings support this view and show that students demonstrate higher levels of cognitive engagement in learning environments where they confront open-ended, multidimensional, and inquiry-oriented questions.

In the context of artificial intelligence, the importance of question-asking becomes even more pronounced through the concept of human–AI collaboration. Contemporary literature emphasizes that artificial intelligence should be considered not as an element replacing human labor, but as a partner that complements human competencies (Brynjolfsson & McAfee, 2017). In this collaboration model, the human role comes to the fore in defining the problem, determining goals, and conducting contextual and ethical evaluations. Artificial intelligence functions as a support mechanism providing analytical and computational capacity within this framework.

The research findings indicate that education systems do not systematically develop the competencies needed to support this collaboration model. In particular, exam-oriented assessment approaches based on a single correct answer are observed to limit question-asking skills and critical thinking. This suggests that education systems remain distant from supporting the human–machine interaction required by the age of artificial intelligence.

  

In this context, the question-asking skill must be pedagogically repositioned. The research findings show that inquiry-based learning, discussion-based instruction, and problem-based learning approaches increase individuals' capacity to work effectively with artificial intelligence (Fullan & Langworthy, 2014). These approaches make it possible for students not only to access information, but also to question the boundaries and assumptions of knowledge.

As a result, education in the age of artificial intelligence should aim not to teach individuals "what to think," but "how to think" and "which questions to ask." This transformation necessitates an educational understanding that strengthens human–AI collaboration and places distinctly human competencies at its center.

**4.4. Structural Transformation Requirements of Education Systems**

The research findings show that education systems in the twenty-first century require transformation not only at the curriculum level but also at the structural level. In the literature, it is frequently emphasized that existing education systems have largely been shaped according to the needs of industrial society and struggle to adapt to today's world, which is oriented around knowledge, technology, and uncertainty (Robinson, 2015).

The findings indicate that the centralized, standardized, and exam-oriented structures of education systems constitute a significant barrier to competency-based education. While these structures reduce learning to measurable outputs, they constrain the development of complex competencies such as adaptive thinking, creativity, and ethical reasoning. In the literature, this phenomenon is defined as the "bias toward teaching what is measurable" (Biesta, 2010).

The research findings also show that teacher roles must be redefined within education systems. In competency-based and AI-supported learning environments, teachers evolve from the role of knowledge transmitters to positions in which they design learning processes, provide guidance, and deliver feedback. This transformation makes it necessary to restructure teacher education programs as well. Indeed, the literature emphasizes that developing teachers' digital pedagogical competencies is the key to transformation in education (Koehler & Mishra, 2009).

The findings further indicate that school and university structures must be reorganized to support interdisciplinary learning. Complex global problems cannot be solved within the boundaries of a single discipline; rather, they require integrating different domains of knowledge. This necessitates that education systems adopt interdisciplinary and problem-based learning approaches as central components (Repko & Szostak, 2020).

Finally, it becomes evident that the ethical and value dimensions should not be neglected in the transformation of education systems. In the age of artificial intelligence, education should cultivate individuals who not only use technology but also question its societal impacts and assume ethical responsibility. This approach aligns with the understanding of education as an institution that is not only economic, but also social and humanistic.

**4.5. General Discussion**

The findings obtained in this study largely align with the main trends identified in the literature regarding the transformation of education systems in the age of artificial intelligence. In particular, the findings concerning the limitations of knowledge-based education parallel contemporary reports published by the OECD and the World Economic Forum. The literature emphasizes that knowledge rapidly loses currency and that, for this reason, the primary aim of education should be to develop learning capacity rather than to transmit information (OECD, 2019; World Economic Forum, 2023).

The adaptive thinking and lifelong learning competencies highlighted in this study are increasingly becoming central within the educational sciences literature. The concept of adaptive expertise, whose foundations were laid by Hatano and Inagaki's (1986) early work, is considered in contemporary literature as the key to coping with uncertainty and complexity. Similarly, Fullan and Langworthy (2014) argue that deep learning approaches strengthen students' capacities to adapt to changing conditions. In this context, the study's findings support the view that adaptive thinking is not merely an individual skill but an educational outcome that must be developed systematically.

The emphasis on the central role of question-asking skills in the context of artificial intelligence also aligns with contemporary debates in the literature. While Chin and Osborne (2008) show that high-quality questions increase the depth of learning and support critical thinking, Floridi et al. (2018) argue that the distinctive human role in the age of AI lies in ethical reasoning, contextual evaluation, and the capacity to create meaning. This study brings these

  

approaches together in the educational context and emphasizes that question-asking skills lie at the center of human–AI collaboration.

The findings also indicate that the structural characteristics of education systems pose a significant obstacle to competency-based transformation. Biesta (2010) argues that reducing education to measurable outputs leads to the marginalization of humanistic and ethical dimensions. This critique is consistent with the constraining effects of exam-oriented and standardized education structures on adaptive thinking and creativity identified in the study. Likewise, Robinson (2015) contends that education systems are structured according to the needs of industrial society and struggle to adapt to today's creative and uncertain world.

The findings of this study show that the competency frameworks proposed by the World Economic Forum provide an important reference point, but that these frameworks should not be treated independently of pedagogical and ethical context. The fact that the OECD Learning Compass 2030 framework addresses competencies together with dimensions of individual well-being, social responsibility, and sustainability supports the holistic approach advanced by this study (OECD, 2019).

In conclusion, this general discussion confirms a growing consensus in the literature on the transformation of education systems in the age of artificial intelligence: transformation in education cannot be limited merely to technology integration or curriculum updates. Rather, it requires a deep paradigm shift that addresses together how competencies are defined, by which values they are developed, and how education systems can be restructured around a human-centered understanding.

## 5. CONCLUSION AND RECOMMENDATIONS

In this section, the main conclusions drawn from the study regarding the transformation of education systems in the age of artificial intelligence are presented, followed by recommendations for different stakeholders in education based on these conclusions. The conclusions and recommendations are grounded in findings obtained through the literature review and document analysis and are addressed within a holistic framework by relating them to the relevant literature.

### 5.1. Conclusions

One of the core conclusions of this study is that the traditional knowledge-based understanding of education is structurally inadequate under the rapid, uncertain, and complex conditions of the twenty-first century. The accelerating pace of knowledge production and the fact that knowledge quickly loses currency make it necessary to redefine the fundamental function of education. In the literature, this transformation is explained through competency-based approaches that focus on developing learning capacity rather than transmitting information (OECD, 2019; World Economic Forum, 2023).

Another important conclusion is that competency cannot be limited solely to cognitive knowledge and technical skills. When competency is evaluated as an integrated structure of knowledge, skills, attitudes, and values, it becomes clear that education should encompass not only academic achievement but also individuals' ethical awareness, their attitudes toward learning, and their sense of social responsibility. This conclusion is consistent both with classical competency definitions (Spencer & Spencer, 1993) and with contemporary holistic approaches (Mulder, 2017; OECD, 2019).

The study shows that adaptive thinking and lifelong learning competencies have assumed a central position in the age of artificial intelligence. Considering that individuals will experience multiple occupational and role changes throughout their lives, it is critically important for education systems to cultivate individuals who can adapt to change itself. This finding is consistent with the literature on adaptive expertise and lifelong learning (Hatano & Inagaki, 1986; Fullan & Langworthy, 2014).

Another key conclusion emerging from the study is that the ability to ask questions has become a distinctive human competency in the age of artificial intelligence. AI systems can produce meaningful outputs only to the extent that they are prompted with high-quality questions. This indicates that education systems should move away from approaches that promote memorizing correct answers and instead adopt pedagogical perspectives that develop inquiry, problem definition, and contextual thinking skills (Chin & Osborne, 2008; Floridi et al., 2018).

Finally, the study shows that the centralized, standardized, and exam-oriented structures of existing education systems constitute a major obstacle to competency-based transformation. This finding aligns with critiques of reducing

  

education to measurable outputs and suggests that the humanistic and ethical dimensions of education should be re-centered (Biesta, 2010; Robinson, 2015).

### 5.2. Recommendations

Based on the conclusions obtained in this study, the following recommendations have been developed for different stakeholders in education.

#### 5.2.1. Recommendations for Researchers

It is recommended that researchers move beyond studies that address the relationship between artificial intelligence and education only at the level of technological impact or tool use, and instead focus on research that examines pedagogical, ethical, and social dimensions together. In particular, deepening concepts such as adaptive thinking, question-asking skills, and human–AI collaboration both theoretically and empirically will make significant contributions to the literature (Floridi et al., 2018; Selwyn, 2019).

In addition, it is necessary to increase comparative studies examining how competency-based education approaches operate in different cultural and socioeconomic contexts. Longitudinal research that tracks the effects of these approaches on students' learning processes, career transitions, and social adaptation will produce strong evidence for policymakers (Brown et al., 2011; OECD, 2021).

#### 5.2.2. Recommendations for Teachers and Educators

It is recommended that teachers and educators redesign learning environments in ways that support students' inquiry, problem-solving, and critical thinking skills. Problem-based, project-based, and inquiry-based learning approaches strengthen students' adaptive thinking and deep learning capacities (Fullan & Langworthy, 2014; Hattie, 2012).

The use of artificial intelligence tools in classrooms should be handled in ways that serve pedagogical objectives and observe ethical principles. It is important to support teachers not merely as technology users, but as learning designers in this process. In this context, it is recommended to expand continuous professional development programs aimed at enhancing teachers' digital pedagogical competencies (Koehler & Mishra, 2009; UNESCO, 2020).

#### 5.2.3. Recommendations for Educational Institutions and Administrators

School and university administrators should create institutional structures and flexible learning environments that support competency-based education. Encouraging interdisciplinary learning, project-based work, and collaboration-based instructional models at the institutional level is important for sustaining transformation in education (Repko & Szostak, 2020).

In addition, it is recommended that assessment systems be diversified by moving beyond structures based solely on standardized exams and incorporating tools oriented toward performance, process, and development. Methods such as portfolios, projects, and peer assessment make it possible to monitor competencies more holistically (Boud & Falchikov, 2007).

#### 5.2.4. Recommendations for Decision-Makers and Policymakers

Education policies should be restructured with a competency-based understanding and a long-term perspective. It is important to address curriculum, teacher training, and assessment policies not in isolation but in an integrated and holistic manner. In particular, competencies such as adaptive thinking, lifelong learning, and ethical awareness should be clearly defined in policy documents (OECD, 2019; World Economic Forum, 2023).

Moreover, developing ethical principles and regulatory frameworks regarding the use of artificial intelligence technologies in education will help reduce risks related to data privacy and equity. Such frameworks are critical for preventing technological innovations from deepening educational inequalities (Floridi et al., 2018; UNESCO, 2020).

#### 5.2.5. Recommendations for Families

It is recommended that families support the development of curiosity, inquiry, and positive attitudes toward learning, rather than focusing expectations solely on academic achievement. The relationship established with artificial intelligence and digital technologies should be addressed not only in terms of usage skills, but also through the lenses of critical thinking and ethical awareness (Selwyn, 2019).

  

Strengthening family–school collaboration will contribute to creating consistent learning environments that support children's competency-based development. This collaboration will facilitate the implementation of a holistic educational approach that supports children's academic as well as socio-emotional development.

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# ARTIFICIAL INTELLIGENCE–BASED APPROACHES TO STRENGTHEN QUALITY IN E-LEARNING ENVIRONMENTS

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**ABSTRACT**
With the acceleration of digital transformation in education, e-learning platforms have become a fundamental learning environment for both students and institutions. This development has further increased the need to ensure quality assurance in online learning processes. Artificial intelligence (AI) technologies—particularly adaptive learning systems, predictive analytics, and natural language processing applications—enhance personalization, increase interaction, and improve accuracy in assessment processes. This study aims to examine the contributions of AI-based mechanisms to quality dimensions in e-learning. Based on a systematic review of recent empirical studies and best-practice examples in the literature, it was found that AI-supported quality frameworks provide significant improvements in instructional design, student satisfaction, feedback effectiveness, and performance monitoring. The findings indicate that AI approaches integrated with data-driven evaluation models enable continuous quality enhancement in online learning ecosystems. In conclusion, the study offers recommendations for higher education institutions to develop AI-supported quality assurance strategies aligned with ISO 21001 and ENQA quality standards.

**Keywords:** *Artificial intelligence (AI), E-learning, Digital transformation, Learning analytics, Educational technologies*

## Introduction

The acceleration of digital transformation in higher education has elevated e-learning environments that support students' learning experiences to a strategic position from both pedagogical and institutional perspectives. Although e-learning offers advantages such as location-independent access, rich instructional materials, and flexible interaction opportunities, the sustainable management of these environments requires a robust quality assurance mechanism. Indeed, quality is a multidimensional concept that encompasses not only the functionality of technical infrastructure but also the coherence of learning processes, student satisfaction, the quality of instructional design, and the accuracy of assessment and evaluation practices (Martin et al., 2023). As e-learning environments become increasingly complex, the need for adaptive, data-driven management processes capable of continuously monitoring quality has intensified. In this context, artificial intelligence (AI)-based technologies present critical potential for enhancing the effectiveness of online learning processes (Holmes et al., 2022).

AI components such as adaptive learning algorithms, natural language processing applications, automated assessment systems, and learning analytics personalize the learning experience by analyzing students' behaviors in a multidimensional manner and provide data-driven feedback to instructors. By creating micro-learning pathways that support student achievement and by enhancing objectivity in assessment and evaluation, these technologies contribute to a holistic improvement in quality (Crompton et al., 2023; Papamitsiou & Economides, 2021). Moreover, the data-monitoring capacity offered by AI applications aligns strongly with the principles of continuous improvement and student-centered education advocated by international quality assurance frameworks such as ENQA and ISO 21001. Therefore, examining the impact of AI on e-learning quality is regarded in the contemporary literature not only as a technological innovation but also as a significant research domain from the perspectives of educational management and quality assurance (Siemens & Long, 2022).

## Theoretical Framework

The concept of quality in e-learning is addressed as a multidimensional structure that encompasses not only the functionality of technological infrastructure but also the entirety of pedagogical processes. The quality of instructional design, the level of accessibility, student satisfaction, the reliability of assessment processes, the effectiveness of feedback mechanisms, and the sustainability of learning outcomes constitute the core components of this structure (Martin et al., 2023). In higher education institutions, quality assurance is grounded in the implementation of student-centered learning, transparency in instructional processes, and data-driven improvement cycles in line with the standards defined by ENQA. In parallel, the ISO 21001 Educational

  

Organizations Management System provides a framework that requires educational institutions to accurately analyze student needs, systematically manage their processes, and institutionalize a culture of continuous improvement. These frameworks emphasize the necessity of addressing quality in e-learning environments through a process-oriented rather than solely outcome-oriented approach (Chen et al., 2020).

Artificial intelligence applications in education are regarded as integrated structures that support these quality indicators. Such applications are generally categorized into three main areas. The first category, adaptive learning systems, analyzes students' learning pace, needs, and performance levels to create personalized learning pathways and deliver individualized pedagogical experiences (Köse & Koyun, 2021). The second category, natural language processing–based models, generates automated assessment mechanisms that analyze students' written content and provide immediate, coherent, and personalized feedback, thereby enhancing the efficiency of the learning cycle (Lu et al., 2023). The third category, learning analytics, processes large-scale data sets collected from students to predict academic risks, analyze achievement trends, and support instructors' decision-making processes in a data-driven manner (Papamitsiou & Economides, 2021). When considered collectively, these three application domains demonstrate that AI offers significant structural and pedagogical contributions to improving quality in e-learning environments.

## Method

This study was conducted using a systematic literature review method to examine the effects of artificial intelligence–supported e-learning applications on quality dimensions. The systematic review approach enables a planned, transparent, and replicable analysis of the relevant literature based on clearly defined conceptual frameworks (Zawacki-Richter et al., 2019). Accordingly, academic studies published between 2019 and 2024 were searched in the Web of Science, Scopus, ERIC, and IEEE Xplore databases. During the search process, keywords and combinations such as "artificial intelligence," "e-learning quality," "learning analytics," "adaptive learning systems," and "AI-enabled assessment" were employed. Within the inclusion criteria, the scope of the review was limited to empirical studies focusing on AI applications, publications reporting findings related to quality indicators, and research conducted in higher education contexts. An initial search identified 228 studies; following title, abstract, and full-text screening, 67 studies that met the inclusion criteria were selected for in-depth analysis. This methodological process is consistent with systematic review standards recommended in the literature and strengthens the comprehensiveness of the study's findings (Crompton et al., 2023).

## Findings

### Quality of Instructional Design

The literature provides strong evidence that AI-supported adaptive learning systems enhance the quality of instructional design. Adaptive learning algorithms analyze students' performance histories, learning paces, and levels of interaction with content to generate personalized learning pathways, thereby reducing cognitive load and increasing learning efficiency (Köse & Koyun, 2021). The reviewed studies report that AI-based platforms increase student achievement rates by an average of 18% to 27% compared to traditional online learning models (Holmes et al., 2022). This improvement is associated with the alignment of content with students' cognitive levels, the hierarchical structuring of learning materials, and the effective functioning of real-time feedback mechanisms. Consequently, AI facilitates a transition in instructional design from static content to dynamic and personalized learning flows, thereby strengthening the pedagogical quality of e-learning environments (Crompton et al., 2023).

### Student Satisfaction and Engagement

Student satisfaction and the level of interaction are regarded as key indicators of quality in e-learning environments. AI-based recommendation systems increase the frequency of interaction and strengthen learners' commitment to the learning process by enabling students to encounter content that is more closely aligned with their interests and needs (Baker & Ocumpaugh, 2021). Numerous empirical studies demonstrate that AI-supported interaction tools lead to significant improvements in student satisfaction. For instance, natural language processing–based feedback systems contribute to students' ability to manage their learning processes in a more controlled manner, while the motivational effect of receiving immediate feedback positively influences students' participation in courses (Lu et al., 2023). These advantages offered by AI-supported interaction mechanisms make substantial contributions to enhancing the student experience in e-learning environments and to sustainably improving learning quality.

  

The table below presents the increases in student satisfaction reported in the literature.

**Table 1.** Changes in Student Satisfaction in AI-Supported Platforms

| Study | Sample | AI Application | Increase in Student Satisfaction (%) |
|---|---|---|---|
| Baker and Ocumpaugh (2021) | 812 students | Adaptive learning | 30 |
| Lu, Wang, and Chen (2023) | 410 students | NLP-based feedback | 25 |
| Köse and Koyun (2021) | 520 students | Intelligent recommendation system | 22 |

**Quality of Feedback**

It has been concluded that natural language processing–based feedback systems increase students' learning pace while reducing the assessment workload of instructors. By analyzing students' written expressions, these systems generate immediate, coherent, and personalized feedback, thereby reducing uncertainties in the learning process and contributing to more effective management of cognitive processes (Lu et al., 2023). In particular, the automated analysis of open-ended responses significantly shortens feedback turnaround times and alleviates instructors' workload in assessment processes. This, in turn, enhances assessment consistency and contributes to the acceleration of students' learning cycles (Zhou & Brown, 2020). The advantages provided by AI-based feedback mechanisms thus create a strong foundation for the sustainable enhancement of learning quality in e-learning environments.

**Performance Monitoring and Risk Prediction**

The literature provides extensive support for the high accuracy of learning analytics in predicting student performance. The analysis of student interaction data, activity durations, and content usage behaviors through AI models enables the early identification of students' academic risk levels (Papamitsiou & Economides, 2021). Several empirical studies report that the accuracy rates of predictive models range between 85% and 92% (Siemens & Long, 2022). This high level of accuracy allows institutions to identify at-risk students in a timely manner and implement quality-enhancing interventions such as academic advising, the provision of supportive learning materials, or additional interactive tasks. Consequently, learning analytics–based early warning systems contribute both to improving student success and to the holistic enhancement of quality assurance processes in e-learning environments (Kumar & Sharma, 2022).

The figure below illustrates the results of meta-analyses conducted on the accuracy rates of predictive models.

  

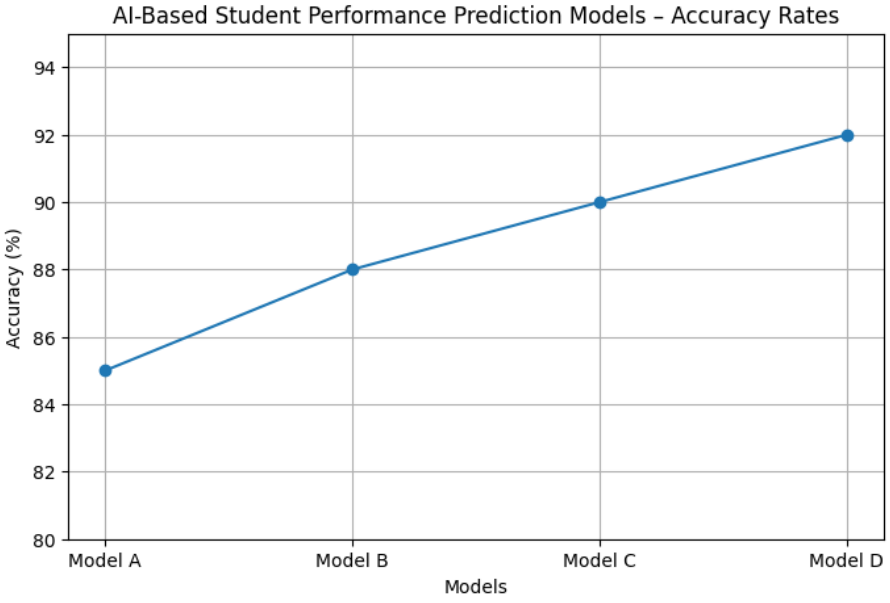


**Figure 1.** Accuracy Rates of AI-Based Student Performance Prediction Models (85%–92%)

**Quality of Assessment and Evaluation**

AI-based automated scoring tools play a significant role in enhancing the quality of assessment and evaluation processes in e-learning environments. By reducing human-induced subjectivity in assessment, these tools strengthen the consistency and objectivity of scoring practices (Zhang et al., 2023). In particular, natural language processing–based analyses of open-ended responses enable a comprehensive evaluation of student answers in terms of both semantic content and grammatical structure, thereby substantially reducing assessor-related errors (Lu et al., 2023). This technology eliminates scoring inconsistencies that may arise among different evaluators and allows students' work to be assessed within a more standardized framework of criteria. At the same time, it accelerates the feedback cycle, enabling students to receive information about their performance in a shorter period. From this perspective, AI-based assessment systems emerge as a critical component that enhances the transparency and reliability of quality assurance processes in e-learning environments (Zhou & Brown, 2020).

**Discussion**

The findings of this study demonstrate that artificial intelligence enhances the quality of e-learning in a multidimensional manner across pedagogical, technological, and managerial dimensions. AI-based adaptive learning systems have been shown to render instructional design more dynamic by offering personalized learning pathways and creating learning flows aligned with students' cognitive needs (Köse & Koyun, 2021). In addition, data-driven management processes supported by learning analytics facilitate the monitoring of student performance and strengthen institutions' capacity for early intervention (Papamitsiou & Economides, 2021). It has also been found that natural language processing–based feedback mechanisms promote transparent and consistent assessment processes, enhance in-class interaction, and increase students' learning motivation (Lu et al., 2023). In this respect, AI applications exhibit direct alignment with ENQA and ISO 21001 quality standards through their contributions to instructional design, student interaction, and assessment quality (Martin et al., 2023).

Nevertheless, the literature also highlights several limitations associated with the integration of artificial intelligence. Data privacy, ethical decision-making processes, and algorithmic bias emerge as significant risk areas, particularly in large-scale, data-driven analyses of student behavior (Durall et al., 2021). The lack of transparency in algorithmic models may lead to the systematic underrepresentation or misclassification of certain student groups (Zhou & Brown, 2020). Moreover, instructors' insufficient digital competencies and difficulties in effectively utilizing AI tools generate a growing need for capacity-building initiatives within institutions (Crompton et al., 2023). Therefore, managing AI applications in alignment with quality standards, institutionalizing ethical guidelines, and implementing continuous digital skills development programs for

  

instructors are of critical importance. This holistic approach, which considers both the opportunities and risks associated with AI, appears essential for ensuring sustainable quality assurance in e-learning ecosystems.

**Conclusion and Recommendations**

AI-supported approaches have become a strategic instrument for contemporary higher education institutions in enhancing the quality of e-learning environments. Based on current findings in the literature, this study demonstrates that AI-based systems provide substantial improvements in personalization, feedback, performance monitoring, and assessment processes. Adaptive learning systems individualize students' learning journeys; natural language processing–based feedback mechanisms strengthen interaction; and learning analytics enable the early identification of student risks (Holmes et al., 2022; Papamitsiou & Economides, 2021). Furthermore, the consistency and objectivity offered by automated assessment tools enhance the transparency of assessment and evaluation processes, thereby providing significant advantages for quality assurance (Zhang et al., 2023). These findings indicate that developing AI-supported quality assurance systems aligned with ISO 21001 and ENQA standards is a critical requirement for the effectiveness and sustainability of digital transformation processes in higher education institutions (Martin et al., 2023).

Several directions for future research are recommended. First, comprehensive examinations of the reliability and validity of AI-based assessment systems across diverse samples are needed. Comparative analyses of AI-supported learning experiences across different disciplines and educational contexts would contribute to a more generalizable understanding of the effects of technology integration. In addition, investigating the long-term impacts of AI applications on learning outcomes through experimental and longitudinal research designs would facilitate a clearer understanding of the sustainable benefits of these technologies in education (Crompton et al., 2023). Research conducted along these lines is expected to make significant contributions both to the development of institutional quality assurance processes and to the strengthening of the pedagogical foundations of AI-supported e-learning practices.

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# ASSESSMENT OF EDUCATIONAL QUALITY IN SPECIAL EDUCATION: NEW INDICATORS AND MONITORING MECHANISMS FOR INCLUSIVE SCHOOLS

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**ABSTRACT**
The assessment of educational quality in special education has become a critical concern within inclusive education systems, where equity, accessibility, and learner-centered outcomes are central priorities. Traditional quality assessment frameworks, which rely predominantly on standardized academic indicators, often fail to capture the multidimensional needs of learners with special educational needs (SEN). This study examines emerging indicators and monitoring mechanisms for assessing educational quality in inclusive schools, with particular attention to pedagogical practices, learning environments, individualized support systems, and student well-being. Using a qualitative, theory-driven approach based on systematic literature review and policy analysis, the study synthesizes international research and inclusive education frameworks. The findings indicate that effective quality assessment in special education requires multidimensional indicators integrating academic progress, social participation, emotional development, and institutional support. The study concludes that inclusive schools benefit from adaptive monitoring systems that emphasize continuous improvement, stakeholder participation, and data-informed decision-making.
**Keywords:** special education; inclusive education; educational quality; quality indicators; monitoring mechanisms

## INTRODUCTION

The global transition toward inclusive education has fundamentally reshaped how educational quality is conceptualized and evaluated in special education contexts. Inclusive schools seek to educate all learners—regardless of disability, learning difficulty, or social disadvantage—within shared learning environments while providing appropriate individualized support. Within this framework, assessing educational quality requires approaches that extend beyond traditional academic achievement metrics to encompass diversity, equity, and inclusion.

Historically, educational quality assessment has emphasized standardized test outcomes, curriculum coverage, and institutional efficiency. However, such approaches inadequately reflect the lived educational experiences of students with special educational needs (SEN), whose learning trajectories are often individualized, non-linear, and multidimensional. Contemporary scholarship increasingly argues that educational quality in special education must be evaluated through indicators related to participation, accessibility, individualized learning, and student well-being.

As inclusive education continues to expand globally, the demand for innovative quality indicators and monitoring mechanisms that are responsive to learner diversity has intensified. This study responds to this need by examining emerging frameworks for assessing educational quality in special education and inclusive schools, with a focus on new indicators and adaptive monitoring mechanisms that support continuous school improvement.

## THEORETICAL FRAMEWORK

The theoretical framework of this study is grounded in an integrative approach that combines inclusive education theory, educational quality assurance frameworks, and ecological models of child development. This multidimensional perspective enables a comprehensive understanding of educational quality in special education contexts, where learner diversity, individualized needs, and systemic responsiveness are central considerations (Ainscow, 2020).

Inclusive education theory conceptualizes educational quality as the capacity of educational systems to respond effectively to learner diversity while ensuring equal participation, accessibility, and a sense of belonging for all students. Within this framework, quality is not confined to measurable academic achievement but is understood as a holistic construct encompassing social inclusion, emotional well-being, learner engagement, and meaningful participation in school life. For students with special educational needs (SEN), educational quality is reflected in the extent to which schools adapt curricula, pedagogical approaches, and assessment practices to individual

  

strengths and challenges. This perspective challenges deficit-oriented models of special education and reframes diversity as a valuable resource that enriches learning environments rather than a deviation from normative standards (Ainscow, Booth, & Dyson, 2006).

Educational quality assurance frameworks contribute a systems-oriented perspective by emphasizing structured processes such as standard setting, indicator development, monitoring cycles, and feedback mechanisms. Traditionally, quality assurance has relied on uniform benchmarks and standardized outcomes to ensure accountability and comparability. However, within inclusive education contexts, such approaches require substantial adaptation. Quality assurance in special education must accommodate individualized learning goals, differentiated instructional pathways, and context-sensitive indicators. From this standpoint, quality assurance shifts from a control-oriented model toward a developmental and formative approach, in which feedback loops are used to support continuous improvement in teaching practices, support services, and institutional coordination (Black & Wiliam, 2009).

Ecological models of development further extend this framework by situating educational quality within a network of interrelated systems that influence learners' development over time. According to this perspective, learning outcomes and well-being emerge from dynamic interactions among students, teachers, families, peers, and broader institutional and policy environments. In special education, this model underscores that educational quality cannot be attributed solely to isolated classroom practices. Instead, it is co-constructed through coordinated support across multiple levels of the educational ecosystem, including family engagement, multidisciplinary collaboration, leadership practices, and community resources (Bronfenbrenner & Morris, 2006).

Taken together, these theoretical perspectives support a multidimensional and dynamic understanding of educational quality in inclusive schools. Quality emerges not as a fixed attribute but as an evolving process shaped by pedagogical responsiveness, institutional capacity, and ecological alignment. This integrated framework provides the conceptual foundation for analyzing educational quality indicators and monitoring mechanisms that are sensitive to learner diversity while maintaining coherence, accountability, and equity within inclusive education systems.

## LITERATURE REVIEW

The literature on educational quality in special education reflects a growing consensus that traditional assessment models are insufficient for capturing the complexity of inclusive educational outcomes. Early research predominantly relied on standardized performance indicators which, although useful for system-level comparison and accountability, often failed to account for the individualized learning trajectories of students with special educational needs (SEN). As a result, such models frequently marginalized these learners by overlooking progress in domains such as social interaction, communication skills, adaptive behaviour, and emotional development.

Numerous studies have demonstrated that standardized testing and uniform benchmarks tend to privilege narrow academic outcomes while providing limited insight into inclusive learning processes. Researchers argue that these models inadequately represent the lived educational experiences of students with SEN, as they disregard contextual factors, instructional adaptations, and support mechanisms that are central to inclusive practice. Consequently, reliance on traditional indicators may lead to distorted evaluations of school effectiveness and may unintentionally reinforce exclusionary practices within ostensibly inclusive systems.

In response to these limitations, recent literature increasingly emphasizes inclusive quality indicators aligned with the principles of equity, personalization, and learner-centered education. Across empirical and policy-oriented studies, key indicators include the implementation fidelity of individualized education plans (IEPs), accessibility of physical and digital learning environments, quality of differentiated instruction, collaboration among teachers and specialists, and active family engagement. Evidence suggests that schools employing such indicators demonstrate higher levels of student participation, stronger social integration, and improved learner satisfaction. Importantly, these indicators allow for a more nuanced understanding of educational progress by recognizing growth relative to individualized goals rather than normative expectations.

The literature also documents a significant shift in monitoring mechanisms toward formative and process-oriented approaches. Rather than relying exclusively on summative evaluations conducted at fixed intervals, inclusive schools increasingly adopt continuous monitoring systems that track student development, instructional responsiveness, and the effectiveness of support services over time. Tools such as learning portfolios,

  

observational assessments, and reflective team meetings are widely identified as effective mechanisms for capturing multidimensional outcomes and informing timely pedagogical adjustments (Booth & Ainscow, 2011).

Policy-oriented and empirical studies further emphasize the importance of stakeholder involvement in quality assessment processes. Teachers, support specialists, parents, and students themselves are increasingly recognized as key contributors to meaningful evaluation practices. Their participation enhances the validity of monitoring data, promotes shared responsibility, and strengthens accountability within inclusive education systems. Research suggests that participatory evaluation fosters a culture of collaboration and reflective practice, which is essential for sustaining inclusive reforms (European Agency for Special Needs and Inclusive Education, 2017).

Overall, the literature supports a decisive shift from narrow, outcome-based assessment models toward holistic and inclusive quality evaluation frameworks. Educational quality in special education is increasingly conceptualized as a complex and evolving construct that reflects academic learning, social participation, emotional well-being, and systemic support. This body of research provides a strong empirical and theoretical foundation for the present study's focus on new indicators and adaptive monitoring mechanisms for inclusive schools (Florian & Black-Hawkins, 2011).

## METHODOLOGY

This study adopts a qualitative systematic literature review combined with policy analysis to examine emerging indicators and monitoring mechanisms for assessing educational quality in special and inclusive education contexts. Peer-reviewed journal articles, international policy documents, and scholarly books published primarily between 2000 and 2024 were selected based on their relevance to special education, inclusive schooling, and educational quality assessment.

A systematic review design was chosen to ensure methodological rigor, transparency, and replicability, in line with established qualitative research standards and the APA 7 guidelines. This approach enabled a structured synthesis of theoretical, empirical, and policy-based evidence while minimizing selection bias.

### Data Sources and Search Strategy

The literature search was conducted across major international academic databases, including **Scopus**, **Web of Science**, **ERIC**, and **Google Scholar**. These databases were selected due to their extensive coverage of peer-reviewed research, international policy publications, and high-impact studies in inclusive and special education.

A structured and replicable search strategy was applied using predefined keywords and Boolean operators. The primary search terms included *inclusive education*, *special education*, *educational quality*, *quality indicators*, *monitoring mechanisms*, *inclusive schools*, and *equity in education*. Searches were conducted within titles, abstracts, and keywords to maximize relevance. In addition, the reference lists of key articles were manually screened to identify further relevant sources.

### Analytical Procedure

The analysis was conducted in three sequential stages:

1. **Identification of core dimensions of educational quality** relevant to special and inclusive education contexts.
2. **Thematic analysis** of proposed quality indicators and monitoring mechanisms across the reviewed literature.
3. **Integrative synthesis**, linking identified indicators and monitoring approaches to inclusive school improvement and system-level quality assurance.

Theoretical triangulation was employed to enhance analytical rigor by integrating perspectives from inclusive education theory, quality assurance frameworks, and ecological models of development. This strategy supported the development of a comprehensive and conceptually grounded interpretation of educational quality in inclusive schools.

### Inclusion and Exclusion Criteria

Publications were included if they met the following criteria:

1. Published in peer-reviewed journals or by internationally recognized organizations;
2. Focused on inclusive or special education at the primary or secondary school level;
3. Explicitly addressed educational quality, evaluation processes, quality indicators, or monitoring mechanisms;
4. Published in English between 2010 and 2025.

  

Publications were excluded if they:

1. Focused exclusively on higher or vocational education;
2. Lacked a clear conceptual or empirical connection to inclusive education or educational quality;
3. Consisted of non-academic opinion pieces without theoretical or methodological grounding.

As this study relied exclusively on secondary data sources, ethical approval was not required.

## FINDINGS AND DISCUSSION

The findings reveal that assessing educational quality in special education requires multidimensional indicators and adaptive monitoring mechanisms that are explicitly aligned with the principles of inclusion, equity, and learner-centeredness. Unlike traditional quality assessment frameworks, which rely heavily on standardized academic outcomes, inclusive education demands evaluation systems capable of capturing individualized progress, participation, well-being, and institutional responsiveness**.** The results of the analysis suggest that educational quality in special education is best understood as a **dynamic and contextual construct**, emerging from the interaction between learners' needs, pedagogical practices, and systemic support structures.

### New Indicators Of Educational Quality In Inclusive Schools

The analysis identifies several key categories of quality indicators that reflect the holistic goals of inclusive education. These indicators move beyond narrow academic achievement and encompass developmental, social, emotional, pedagogical, and institutional dimensions.

**Table 1.** Multidimensional Indicators Of Educational Quality In Inclusive Schools

| Indicator category | Core focus | Description | Contribution to educational quality |
|---|---|---|---|
| Academic and developmental progress | Individual learning outcomes | Progress measured against individualized education plans (IEPs) rather than standardized norms | Ensures fairness and recognizes diverse learning trajectories |
| Social participation and inclusion | Belonging and interaction | Peer relationships, participation in classroom and school activities | Promotes social integration and reduces exclusion |
| Emotional and psychological well-being | Supportive environment | Emotional safety, motivation, self-esteem, and resilience | Enhances engagement and readiness to learn |
| Pedagogical quality | Instructional practices | Differentiated instruction, Universal Design for Learning (UDL), adaptive assessment | Improves access to learning for all students |
| Institutional support | Systemic collaboration | Cooperation among teachers, specialists, families, and leadership | Sustains inclusive practices and continuous improvement |

The findings demonstrate that **academic progress alone is insufficient** as a quality indicator in special education. Measuring learning relative to individualized goals allows schools to recognize meaningful progress that would otherwise remain invisible in standardized assessments. (Hattie, J. (2009). Visible learning. Routledge).

Inclusive education is a multi-faceted concept. Springer.Similarly, indicators of social participation and well-being highlight inclusion as both an educational outcome and a process. Pedagogical quality and institutional support function as enabling conditions, ensuring that inclusive values are translated into daily practice.

### Monitoring Mechanisms For Inclusive Education

Beyond identifying appropriate indicators, the findings emphasize the importance of **adaptive monitoring mechanisms** that support continuous reflection and improvement rather than external control or compliance.

**TABLE 2.** Monitoring Mechanisms Supporting Inclusive Educational Quality

| Monitoring mechanism | Key features | Data sources | Role in inclusive education |
|---|---|---|---|
| Formative assessment | Ongoing, flexible, learner-centered | Classroom observations, learning tasks | Adjusts instruction to individual needs |
| Progress portfolios | Longitudinal documentation | Student work samples, teacher reflections | Tracks individual development over time |
| Observational | Context-sensitive | Behavioural and social | Captures non-academic |

  

| | | | |
|---|---|---|---|
| assessment | evaluation | interaction data | learning outcomes |
| Reflective team reviews | Collaborative decision-making | Multidisciplinary team input | Aligns support strategies across professionals |
| Family and student feedback | Participatory evaluation | Surveys, interviews, meetings | Ensures stakeholder voice and accountability |

Schools employing formative and participatory monitoring tools are better equipped to respond to learners' evolving needs. Unlike summative evaluations, these mechanisms allow for timely instructional adjustments and support personalization.(Mitchell, D. (2015). Inclusive education is a multi-faceted concept. Springer). The involvement of families and multidisciplinary teams further strengthens monitoring processes by integrating diverse perspectives into decision-making.

**The Role Of Digital Monitoring Systems**

The findings also indicate that **digital data systems** are increasingly central to inclusive quality monitoring. When used appropriately, digital platforms enable schools to integrate academic, behavioural, and support-related data into coherent frameworks. ( OECD. (2012). Equity and quality in education. OECD Publishing).

**Table 3.** Digital Tools In Inclusive Quality Monitoring

| **Digital tool** | **Integrated data** | **Advantages** | **Potential risks** |
|---|---|---|---|
| Student information systems | Academic and attendance data | Centralized tracking | Overreliance on quantitative metrics |
| IEP management platforms | Individual goals and interventions | Consistency and transparency | Administrative burden |
| Behavioural tracking tools | Social and behavioural indicators | Early identification of needs | Risk of labeling if misused |
| Data dashboards | Multidimensional indicators | Informed decision-making | Requires professional data literacy |

The effectiveness of digital monitoring depends on how data are interpreted and used. The findings stress that digital systems should support **professional judgment and reflective practice**, not replace them. When monitoring is framed as a tool for improvement rather than surveillance, it fosters a culture of trust and continuous learning.

**Integrated Discussion**

The integrated findings challenge **traditional, uniform approaches** to educational quality assessment that prioritize compliance with rigid standards. Instead, the evidence supports a **context-sensitive, learner-centered model** in which quality emerges from the alignment of indicators, monitoring mechanisms, and inclusive values.

In special education, quality assessment functions most effectively as an **ongoing, collaborative process** involving teachers, specialists, families, and students.( OECD. (2017). Students' well-being: PISA 2015. OECD Publishing).

This process-oriented perspective recognizes diversity as a resource rather than a problem and positions assessment as a means of supporting both equity and excellence.

**Table 4.** Traditional Vs. Inclusive Approaches To Quality Assessment

| **Dimension** | **Traditional model** | **Inclusive model** |
|---|---|---|
| Focus | Standardized outcomes | Individualized and holistic outcomes |
| Indicators | Academic achievement | Academic, social, emotional, institutional |
| Monitoring purpose | Accountability and control | Improvement and adaptation |
| Stakeholder involvement | Limited | Broad and participatory |
| Underlying values | Uniformity | Equity and inclusion |

The findings suggest that educational quality in special education does not result from strict adherence to standardized benchmarks but from **responsive systems** that adapt to learner diversity. (OECD. (2019). Education at a glance. OECD Publishing). By integrating multidimensional indicators with adaptive monitoring mechanisms, inclusive schools are better positioned to support meaningful learning, participation, and well-being for all students.

  

## CONCLUSION AND RECOMMENDATIONS

This study demonstrates that assessing educational quality in special education and inclusive schools requires a fundamental rethinking of both quality indicators and monitoring mechanisms. Traditional academic metrics alone are insufficient to capture the complexity of inclusive learning environments and the diverse developmental trajectories of learners with special educational needs (SEN) (OECD, 2020).

The findings underscore the importance of adopting multidimensional quality indicators that integrate academic, social, emotional, and institutional dimensions of learning (Stufflebeam & Coryn, 2014). Equally, effective monitoring mechanisms must be continuous, formative, and participatory, enabling data-informed decision-making and supporting sustained school improvement processes.

The results further indicate that effective inclusive education systems rely on clearly defined quality indicators that reflect principles of equity, participation, and learner-centered practice. Monitoring mechanisms play a crucial role in ensuring accountability, supporting evidence-based educational decision-making, and fostering continuous improvement within inclusive schools (Slee, 2018).

However, the review also identified persistent gaps between inclusive education policy intentions and practical implementation. These gaps are particularly evident in areas related to teacher professional preparation, the use of data-driven monitoring systems, and overall institutional capacity (UNESCO, 2017).

Overall, the study highlights the necessity of integrating inclusive values with measurable and context-sensitive quality frameworks to enhance educational outcomes for learners with diverse needs. The proposed indicators and monitoring approaches offer a conceptual foundation for strengthening quality assurance systems in special and inclusive education settings.

Based on the findings of this study, the following recommendations are proposed (Waitoller & Artiles, 2013):

1. Policymakers should develop and implement comprehensive quality frameworks for inclusive education that incorporate clear, measurable, and context-sensitive indicators aligned with international standards.
2. Educational institutions should strengthen monitoring and evaluation mechanisms by systematically collecting and analyzing data related to learner participation, achievement, and well-being in inclusive settings.
3. Continuous professional development programs should be provided for teachers and school leaders to enhance competencies in inclusive pedagogy, assessment, and quality assurance practices.
4. Collaboration between schools, families, and multidisciplinary support services should be expanded to ensure holistic monitoring of learners' academic and social development.
5. Future research should focus on the empirical validation of inclusive education quality indicators and examine the effectiveness of monitoring mechanisms across diverse educational and cultural contexts.

These recommendations aim to support the development of sustainable, equitable, and high-quality inclusive education systems that respond effectively to learner diversity (World Health Organization, 2011).

In conclusion, inclusive schools achieve higher educational quality when assessment frameworks are aligned with inclusive values and focused on learner-centered outcomes. Continued empirical research is required to validate inclusive quality indicators and to examine the long-term impact of adaptive monitoring systems on student success.

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# AUTHENTIC AND TRANSFORMATIONAL LEADERSHIP IN EDUCATIONAL MANAGEMENT: A COMPARATIVE REVIEW AND SYNTHESIS

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## ABSTRACT

This study examines authentic and transformational leadership in educational settings by integrating systematic literature findings with large-scale trend analyses from Web of Science, Scopus, and Scopus AI. Drawing on conceptual foundations, empirical evidence, and AI-supported semantic mapping, the study analyzes the core dimensions, mechanisms, teacher-related outcomes, and cultural contexts associated with both leadership styles. Results indicate that authentic leadership primarily strengthens teachers' autonomy, well-being, trust, and ethical climate through mechanisms such as relational transparency, emotional support, and organizational justice. Transformational leadership, meanwhile, exerts a stronger influence on innovation, collective efficacy, job satisfaction, and organizational commitment, driven by inspirational motivation, intellectual stimulation, and shared vision.

Database trends show that research on transformational leadership is substantially more extensive and historically rooted, whereas authentic leadership has emerged more recently and remains less represented, particularly in longitudinal designs. Scopus AI analysis reveals three dominant thematic clusters: authentic leadership, transformational leadership, and comparative or integrative studies. Both leadership styles exhibit significant conceptual overlap, yet they differ in their psychological pathways and contextual sensitivity. Cross-cultural variability highlights the moderating role of educational governance, collectivism, and policy structures.

The study identifies key gaps, including the scarcity of longitudinal and hybrid models, limited cross-cultural comparative work, and measurement challenges due to construct overlap. It concludes that integrating authentic and transformational leadership may offer a more comprehensive framework for fostering sustainable innovation, teacher well-being, and ethical school cultures.

**Keywords:** *Authentic leadership, Transformational leadership, Educational leadership, Scopus AI analysis, Comparative leadership studies.*

## INTRODUCTION

Leadership research historically evolved from trait theories, behavioral approaches, and contingency models; however, since the 1980s, ethical scandals, increasing demands for organizational change, and the complexity of human interaction have shifted leadership studies from task-centered frameworks toward relational, ethical, and transformational paradigms (Avolio & Gardner, 2005; Cemaloğlu & Özdemir, 2019). Within this modern landscape, authentic leadership and transformational leadership have become central models positioned at the intersection of positive organizational behavior, ethics, and organizational psychology (Walumbwa et al., 2008; Çevik, 2024).

Both approaches conceptualize leadership as more than administrative task completion; leaders are framed as psychological, moral, and relational agents capable of shaping followers' identities, motivations, and organizational meaning systems (Anderson, 2017; Kareem et al., 2023). This is particularly salient in educational institutions, where human development is the core organizational mission.

## AIM

The purpose of this study is to systematically examine the theoretical foundations, mechanisms, and educational implications of authentic leadership (AL) and transformational leadership (TL), and to compare their effects on teacher outcomes, organizational culture, and institutional innovation. Drawing on empirical evidence and conceptual developments from the past two decades, the study aims to synthesize findings from Web of Science (WoS) and Scopus-indexed publications, including trend analyses generated through Scopus AI. A further aim is to identify conceptual overlap, mediating mechanisms, contextual moderators, and methodological gaps-particularly the scarcity of longitudinal and integrated leadership models in educational research. By doing so, the

study contributes to building a comprehensive and analytically differentiated understanding of how AL and TL shape educational environments and to illuminate future directions for research and practice.

## SIGNIFICANCE

The significance of this study lies in the growing recognition that leadership is among the most influential determinants of teacher well-being, professional growth, school climate, and student achievement (Anderson, 2017; Kareem et al., 2023). Although authentic and transformational leadership have emerged as two of the most prominent paradigms in contemporary educational leadership, the existing literature reveals substantial conceptual overlap and an uneven distribution of research emphasis (Çevik, 2024; Xie, Ahmad, & Lu, 2024a).

Transformational leadership is far more extensively studied, with publication volumes in WoS and Scopus up to seven times higher than those of authentic leadership. This imbalance reflects both historical precedence (Bass, 1985; Burns, 1978) and methodological convenience, as TL outcomes are more readily measurable using validated instruments such as the MLQ-5X. In contrast, authentic leadership-despite its importance for psychological well-being, ethical climate, relational trust, and transparency-remains less empirically explored and is often investigated through cross-sectional designs (Walumbwa et al., 2008; Hsu et al., 2024).

This study is significant because it brings together fragmented scholarly insights through a comparative, mechanism-based, and context-sensitive synthesis, revealing:

- how AL and TL differentially influence teacher autonomy, innovation, organizational commitment, and psychological capital;
- the mediating roles of trust, self-efficacy, collective efficacy, and organizational culture;
- the moderating effects of cultural norms, collectivism, and policy structures;
- the need for longitudinal and hybrid leadership models to reflect real-time school dynamics.

By integrating database trends, empirical findings, and conceptual frameworks, this study provides a more holistic understanding of leadership in education and identifies avenues for more precise, culturally responsive, and methodologically rigorous future research.

## METHOD

This study adopts an integrated multi-stage research design combining systematic review procedures, database-driven trend analytics, and concept-level synthesis informed by Scopus AI. The methodology was updated to incorporate the analytical categories reflected in Table 8, including leadership dimensions, teacher impact, mediators, measurement tools, cultural contexts, and longitudinal research gaps.

### 1. Systematic Literature Review

A structured review of peer-reviewed research on authentic (AL) and transformational leadership (TL) in educational settings was conducted. The review included:

- conceptual and empirical studies on AL and TL,
- comparative and integrated leadership research,
- studies examining mechanisms such as self-efficacy, trust, and organizational culture,
- research addressing teacher outcomes (e.g., autonomy, well-being, innovation, job satisfaction).

The dataset included 13 core open-access studies plus additional seminal works across leadership theory.

### 2. Web of Science (WoS) and Scopus Trend Analysis

To capture broader scholarly patterns, targeted searches were conducted in WoS and Scopus using:

- *"authentic leadership" AND education*
- *"transformational leadership" AND education"*

Inclusion criteria:

- peer-reviewed journal articles
- English language

— social sciences, education, management, psychology, and multidisciplinary fields
— publication years 1992–2026 (database-specific)

The extracted data were organized according to:

— annual publication distribution
— disciplinary distribution
— country contributions
— volume comparison of AL vs. TL studies

These results informed the comparative portions of Table 8.

**3. Scopus AI–Supported Meta-Analytic Concept Mapping**

A Scopus AI–driven semantic analysis was performed to identify:

— thematic clusters around AL, TL, and comparative/integrative models
— leadership dimensions (e.g., self-awareness, idealized influence)
— organizational and psychological mediators (e.g., autonomy, collective efficacy, emotional intelligence)
— measurement tools (ALQ, MLQ-5X, GTLS)
— cultural contextual moderators (e.g., collectivism, policy systems)
— gaps in longitudinal and integrated research

This analysis directly shaped the structure of Table 7 and Table 8.

**4. Comparative Synthesis Based on Table 8 Categories**

Using the dimensions of Table 8, the integrative analysis compared AL and TL along the following domains:

— Core dimensions (AL: self-awareness, transparency, moral perspective; TL: idealized influence, inspiration, intellectual stimulation)
— Impact on teachers (AL → well-being, autonomy, ethical climate; TL → innovation, self-efficacy, commitment)
— Mediators (e.g., trust, psychological safety, collective efficacy)
— Measurement instruments (ALQ vs. MLQ-5X/GTLS)
— Cultural contexts (collectivism, centralization, policy frameworks)
— Longitudinal/integrated research gaps

These dimensions were used to build cross-model comparisons and identify fine-grained construct overlap ($\rho \approx .72$) and differentiation needs.

**5. Narrative Integration and Research Gap Identification**

Given the heterogeneity of the sources (empirical, conceptual, AI-derived), a narrative synthesis was conducted to:

— integrate AL and TL contributions to teacher outcomes,
— analyze mediating organizational cultures,
— explore emotional intelligence as a cross-cutting moderator,
— compare cross-cultural findings across education systems,
— highlight methodological limitations (dominance of cross-sectional designs),
— identify research needs for hybrid models and longitudinal designs.

Ethical approval was not required, as the study used secondary data.

## THEORETICAL FOUNDATIONS

### Theoretical Foundations of Authentic Leadership

Authenticity emphasizes congruence between a leader's values, identity, and actions. The conceptual roots of authentic leadership stem from positive psychological development (Avolio & Luthans, 2003), ethical leadership,

and self-regulation theories (Kernis, 2003). Walumbwa et al.'s (2008) influential four-dimensional model-self-awareness, relational transparency, balanced information processing, and internalized moral perspective-frames authentic leadership as a value-driven and trust-oriented approach.

Authentic leaders foster alignment between inner values and outward behaviors, thereby enhancing perceptions of integrity, credibility, and psychological safety (Khanyile & De Bruin, 2022). Theoretically, authentic leadership intersects with positive organizational behavior (Luthans & Youssef, 2004), ethical leadership, and social learning theory (Bandura, 1997), all of which emphasize moral modeling and relational consistency.

The core assumption is that when leaders act in accordance with their genuine selves, followers internalize both the leader and the organizational mission more readily, strengthening psychological well-being, moral agency, and organizational commitment (Xie, Ahmad, & Lu, 2024a).

**Empirical Findings in Educational Contexts.** Recent educational studies provide robust support for the relational and psychological effects of authentic leadership.

- Feng (2016) found, in a study of 1,429 teachers, that all four dimensions of authentic leadership significantly enhance teachers' psychological capital, especially hope, resilience, and optimism.
- Hsu et al. (2024) reported that self-awareness, relational transparency, and balanced processing substantially increase teachers' creativity and job performance.
- Systematic reviews confirm its positive association with trust, ethical climate, participatory decision-making, and reduced burnout (Çevik, 2024; Khanyile & De Bruin, 2022).

However, authentic leadership shows weaker effects on innovation and rapid change, suggesting a contextual limitation in dynamic reform environments.

## Theoretical Foundations of Transformational Leadership

Transformational leadership originates from Burns' (1978) distinction between transactional and transformational leadership and is deeply informed by social change theory. Bass (1985) operationalized the model through four dimensions: (1) Idealized influence, (2) Inspirational motivation, (3) Intellectual stimulation, (4) Individualized consideration.

Bass and Avolio (1994) later integrated these in the Full Range Leadership Model, positioning transformational leadership alongside transactional and laissez-faire styles within a broader system.

Early contributors such as Downton (1973) and House (1977) emphasized charisma, value-driven influence, and visionary orientation, situating transformational leadership as a strategic, motivational, and future-oriented paradigm. This model has been widely supported across organizational contexts, particularly due to its capacity to mobilize followers toward collective goals, identity transformation, and innovation (Gumusluoglu & Ilsev, 2009; Williams, 2016).

**Empirical Findings in Educational Contexts.** Transformational leadership is among the most widely researched models in education, consistently linked to:

- higher teacher motivation and organizational commitment (Kareem et al., 2023),
- enhanced school performance (Ramos, 2025),
- stronger institutional innovation (Elrehail et al., 2018),
- organizational learning and knowledge sharing (Anderson, 2017).

A notable finding from Elrehail et al. (2018) is that transformational leadership strongly predicts both process and product innovation, especially when knowledge-sharing norms are high. The same study reported that authentic leadership showed no significant relationship with innovation, highlighting a key divergence between the two models.

## Comparison of Authentic and Transformational Leadership

### 1. Focus and Purpose

- Authentic leadership prioritizes moral grounding, self-awareness, ethical consistency, and relational transparency (Walumbwa et al., 2008).

— Transformational leadership centers on organizational vision, collective motivation, and change mobilization (Bass, 1985).

**2. Theoretical Foundations**

— Authentic leadership: positive psychology, ethical leadership, self-regulation, values-based leadership (Avolio & Luthans, 2003).
— Transformational leadership: social change theory, charismatic leadership, and the Full Range Leadership Model (Burns, 1978; Bass & Avolio, 1994).

**3. Psychological and Organizational Outcomes**

— Authentic leadership → trust, ethical climate, psychological capital, well-being, relational cohesion (Khanyile & De Bruin, 2022; Xie et al., 2024b).
— Transformational leadership → motivation, innovation, performance, organizational commitment, pedagogical change (Anderson, 2017; Ramos, 2025).

**4. Innovation and Change**

— Transformational leadership is strongly innovation-oriented (Gumusluoglu & Ilsev, 2009; Elrehail et al., 2018).
— Authentic leadership has limited or context-dependent effects on innovation.

**5. Educational Context Implications**

— Authentic leadership supports ethical climate, emotional well-being, and trust among teachers.
— Transformational leadership drives structural change, digitalization, school performance, and reform implementation.

**Toward an Integrated Authentic–Transformational Leadership Synthesis**

Contemporary literature increasingly emphasizes that the two models should not be viewed as mutually exclusive but as complementary (Çevik, 2024; Anderson, 2017).

Authentic leadership provides the ethical, relational, and psychological foundation necessary for sustainable leadership practices. Transformational leadership builds on this foundation to mobilize change, foster innovation, and produce measurable organizational outcomes.

Thus, the most effective educational leadership model is a hybrid authentic–transformational orientation, which combines:

— authenticity → trust, ethics, transparency, psychological safety;
— transformational capacity → vision, innovation, collective motivation, organizational learning.

This synthesis aligns with the dual nature of contemporary educational institutions, which require both ethical-relational stability and strategic-innovative dynamism.

## TRENDS IN CURRENT RESEARCH ON AUTHENTIC AND TRANSFORMATIONAL LEADERSHIP IN EDUCATION: A WEB OF SCIENCE AND SCOPUS–BASED REVIEW

In addition to the primary literature reviewed above, a complementary database analysis was conducted using Web of Science (WoS) and Scopus to identify current trends in educational research on authentic and transformational leadership. Searches were performed using the keywords “authentic leadership” AND education and “transformational leadership” AND education, limited to peer-reviewed journal articles written in English within the social sciences, humanities, management sciences, and multidisciplinary fields.

### Findings on Authentic Leadership in Educational Research

Based on the predefined inclusion criteria, the Web of Science database contains 167 peer-reviewed journal articles addressing authentic leadership in educational contexts. These studies are predominantly situated within Education (84 articles, 50.29%) and Management (50 articles, 29.94%). The earliest article indexed in WoS on this topic dates back to 2009.

**Table 1. Fields of Publications on Authentic Leadership in Education in WoS (2009–2025)**

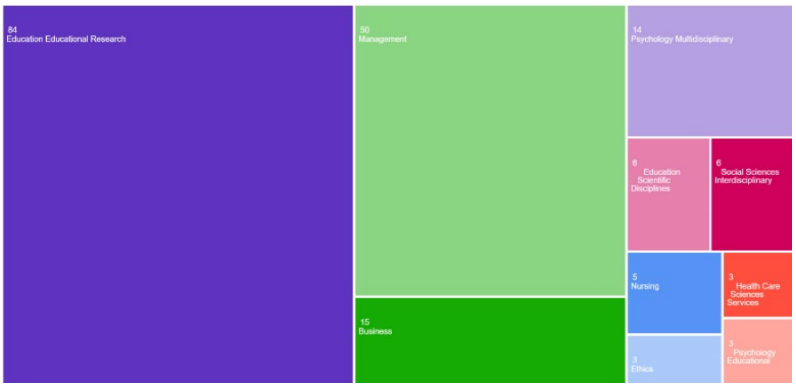
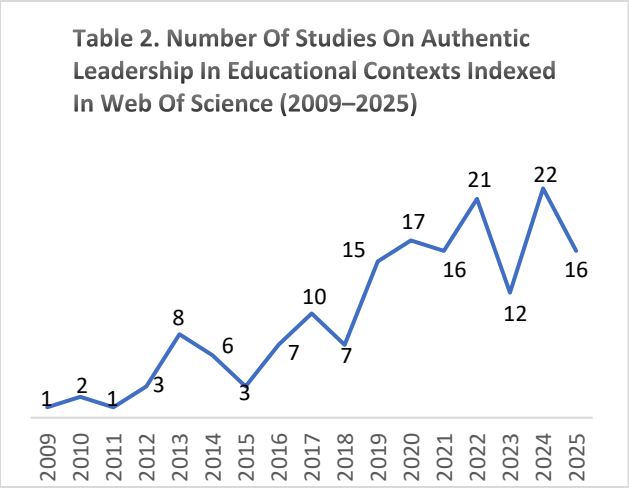
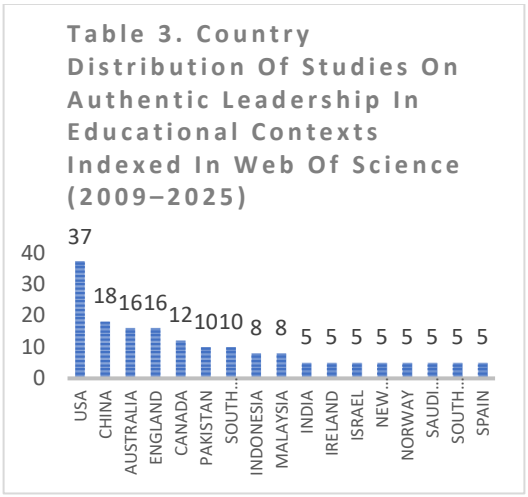



**Table 2–3. Distribution by Publication Year and Country (WoS).**



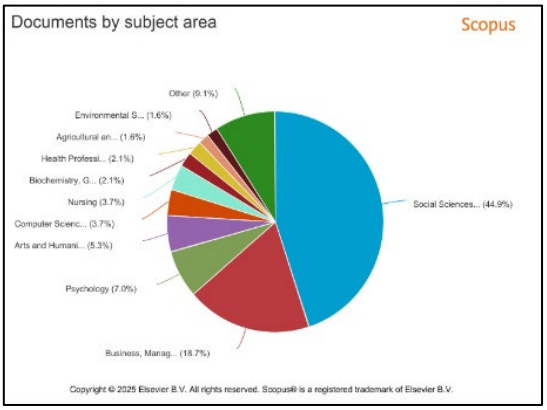



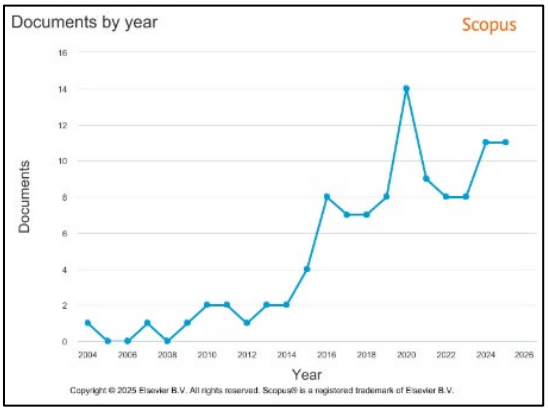

The tables indicate that the scholarly discourse around authentic leadership in education has emerged prominently over the past 15–20 years, with a significant growth in the last decade. Specifically, 119 of the 167 articles (71.26%) were published within the last seven years, demonstrating increasing academic attention.

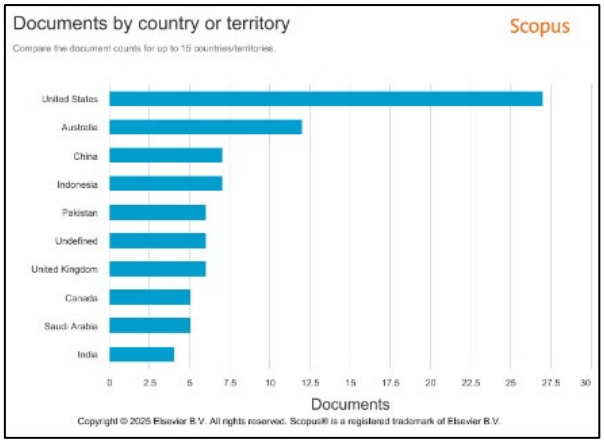
In terms of geographic distribution, the majority of publications originate from the United States, China, Australia, the United Kingdom, and Canada, with Türkiye ranked 12th with three publications.

## Scopus Trends on Authentic Leadership in Education

**Table 4. Distribution of Publications in Scopus by Field, Year, and Country (2004–2025)**






As shown in Table 4, similar tendencies exist in Scopus. A total of 107 peer-reviewed English-language articles are indexed, spanning a broader time range (2004–2025). Most studies fall within:

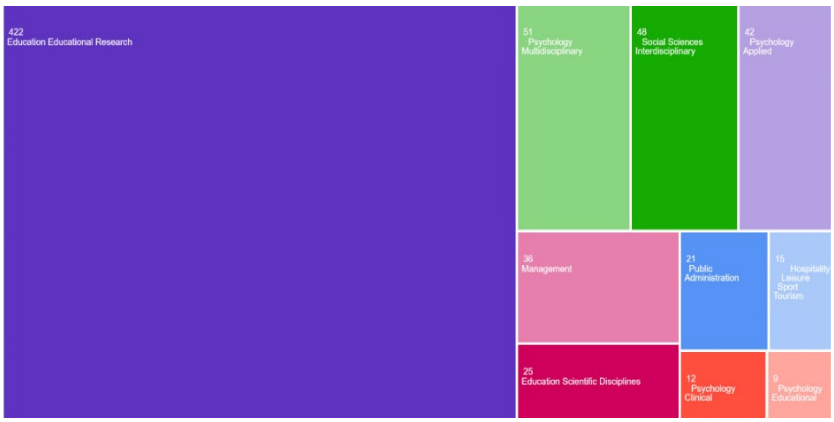
— Social Sciences (44.9%) and Management and Business (18.7%), with the remaining percentage distributed across psychology, education, and cross-disciplinary fields.

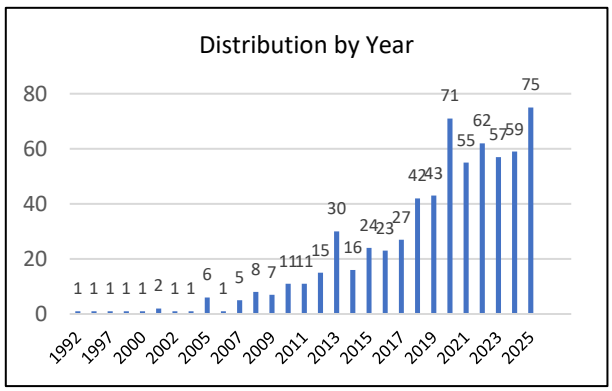
Importantly, 91 of the 107 articles (85.05%) have been published within the last ten years, indicating accelerated interest. As in WoS, the United States leads the field, followed by Australia, China, Indonesia, and Pakistan. Notably, only one article in Scopus originates from a researcher affiliated with Türkiye.

**Trends in Transformational Leadership Research in Education**

To provide a comparative understanding, a parallel analysis was conducted for transformational leadership.

**Table 5. Web of Science Publications on Transformational Leadership in Education (1992–2025)**



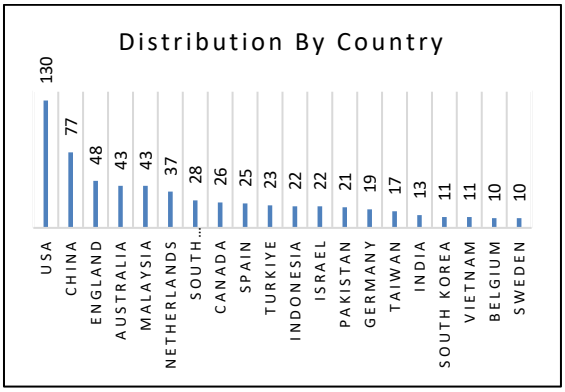
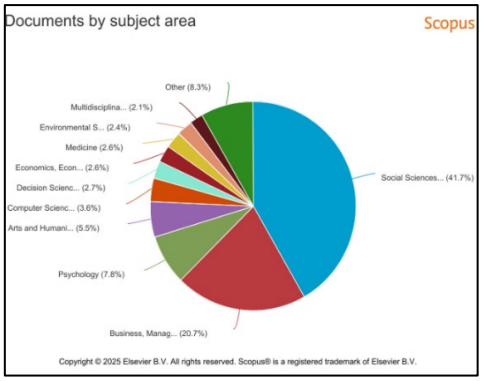
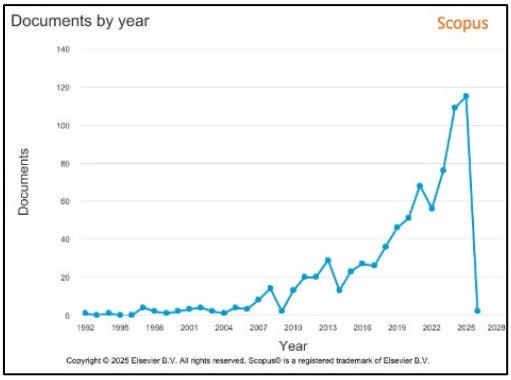
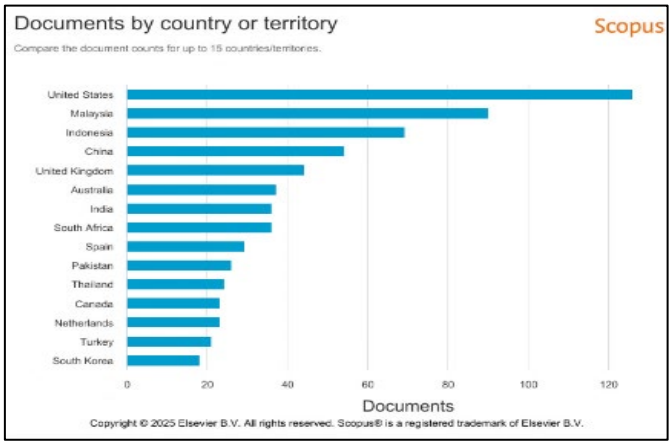



**Table 6. Scopus Publications on Transformational Leadership in Education (1992–2026)**




The findings reveal that transformational leadership has generated significantly more research attention compared to authentic leadership:

- 657 articles in Web of Science (≈4 times more than authentic leadership),
- 784 articles in Scopus (≈7 times more).

The earliest studies appear in 1992, indicating a much longer research tradition. Publication frequency increases sharply beginning in 2013, with the highest concentration of studies emerging in the last five years.

This trend suggests that transformational leadership is more extensively theorized and empirically tested in educational settings.

### Reasons for Greater Research Volume

Two primary explanations account for this difference:

1. Transformational leadership predates authentic leadership, allowing for a longer period of theoretical development and empirical exploration.
2. Transformational leadership outcomes are more easily measurable, making it more suitable for quantitative research designs. Authentic leadership, however, typically requires more nuanced, complex, and labor-intensive qualitative methodologies, limiting its volume of empirical work.

### Field Distribution

The disciplinary distribution mirrors that of authentic leadership yet with higher density:

- In WoS, 64.23% of transformational leadership studies fall within education.

- In Scopus, 41.7% are in social sciences, and 20.7% are in management.

***Geographical Trends.*** While the United States remains the leading contributor, subsequent positions are occupied by Australia, Indonesia, Pakistan, and Türkiye, among others. Türkiye demonstrates notable scholarly engagement:

- 10th in WoS with 23 publications,
- 14th in Scopus with 21 publications.

This reflects both the increasing involvement of researchers in Eastern contexts and an expanding interest in the cultural relevance of leadership models.

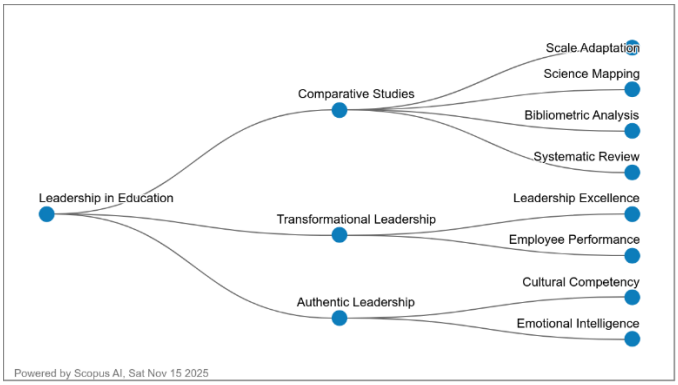
An additional observation based on Scopus's AI topic analysis indicates that recent influential contributors (e.g., Mingyu Hou, Yi Zhao, Jamilah Binti Ahmad) predominantly examine the impact of transformational leadership on school-level outcomes, further reinforcing its contemporary relevance in global educational research agendas.

**Scopus AI–Supported Field Analysis**

Leadership in education is a critical determinant of teacher development, institutional culture, and student outcomes. Among various leadership paradigms, authentic and transformational leadership have received substantial attention due to their potential to foster innovation, well-being, and professional engagement among educators. The present analysis aims to summarize current research trends in Scopus pertaining to these leadership styles, their dimensions, mediating mechanisms, and comparative effects, and to identify key gaps and future research directions in the field of educational leadership.

The analysis is based on insights generated through Scopus AI, which provides an advanced meta-analytic synthesis of studies indexed in the Scopus database. Below is the concept map model illustrating the thematic structure of authentic and transformational leadership research within Scopus.

**Table 7. Concept Map of Studies on Authentic and Transformational Leadership Indexed in Scopus**




As illustrated in the concept map, research on these leadership styles in Scopus converges around three primary thematic areas:

1. Transformational leadership,
2. Authentic leadership,
3. Comparative or integrative studies.

The following section provides a closer summary of the research emerging within these themes.

**DIMENSIONS AND MECHANISMS OF AUTHENTIC AND TRANSFORMATIONAL LEADERSHIP IN EDUCATION**

Transformational leadership is grounded in cultivating a shared vision, supporting organizational change, and encouraging educators to transcend conventional boundaries. Empirical findings indicate that transformational

leadership enhances teachers' openness to pedagogical innovation, willingness to experiment with new instructional methods, and commitment to institutional goals. These effects typically emerge through mechanisms such as self-efficacy, psychological safety, positive organizational climate, and learning-oriented school cultures. Through these mediators, transformational leadership facilitates the institutionalization of innovative practices.

Authentic leadership, in contrast, is rooted in ethical behavior, transparent communication, self-awareness, and the establishment of trust-based relationships with followers. This leadership style strengthens teachers' sense of autonomy, their perceptions of meaningful work, and their psychological well-being. The mechanisms involved include trust, emotional support, ethical climate, and perceptions of justice. Authentic leadership demonstrates a particularly protective function during periods of teacher burnout and professional uncertainty.

Across both leadership styles, emotional intelligence emerges as a significant moderating factor. Leaders with higher emotional awareness strengthen the motivational and innovative outcomes of transformational leadership, while reinforcing the trust-building and ethical sensitivity dimensions of authentic leadership. As such, leadership development programs increasingly integrate emotional and social–emotional competencies.

## COMPARATIVE INSIGHTS AND FUTURE DIRECTIONS

Although both authentic and transformational leadership are associated with positive organizational outcomes, conceptual overlap among measurement instruments complicates efforts to clearly distinguish these constructs. Component-level analyses show that transformational leadership is more closely tied to innovation, institutional engagement, and motivation for change; authentic leadership, however, more strongly influences teacher autonomy, well-being, and perceptions of ethical climate.

Organizational citizenship behaviors and creativity are supported by both leadership styles, yet through distinct pathways:

- In transformational leadership, these outcomes arise through shared vision and institutional identification.
- In authentic leadership, they emerge through trust, honest communication, and ethical norms.

Cultural context is a crucial factor in understanding differential impacts. Transformational leadership may exhibit stronger effects in centralized educational systems, whereas authentic leadership may be more effective in contexts with strong expectations for social support and justice. This aligns with existing findings highlighting culture as a key moderating variable.

### Need for Longitudinal and Integrated Approaches

Longitudinal research examining the combined effects of authentic and transformational leadership remains limited. Yet variables such as teacher innovation, school culture, motivation, and well-being evolve over time, making time-sensitive models indispensable. Integrated frameworks evaluating the dynamic interplay between these two leadership styles are therefore essential.

Hybrid models that combine both approaches hold promise for advancing sustainable transformation in education. The visionary and motivational elements of transformational leadership, when merged with the ethical and relational foundations of authentic leadership, can simultaneously enhance innovation and teacher well-being.

Cross-cultural studies would offer valuable insights into how these leadership styles are perceived in diverse governance systems and under varying socio-cultural norms. Research conducted outside Western contexts is especially needed to explain differential effects on teacher creativity, knowledge sharing, and perceived organizational support.

### Research Gaps and Mentorship Perspectives

Significant research gaps include:

- Limited studies examining authentic and transformational leadership together,
- Insufficient exploration of mentoring and teacher leadership within leadership development frameworks,
- Measurement tools lacking sufficient discriminatory power to differentiate between the two constructs.

Challenges in mentoring—such as power asymmetries, time constraints, and lack of expertise—highlight the need for deeper investigation. Facilitating factors include collaborative cultures, high motivation, structured professional development, and systematic feedback mechanisms.

Social justice–oriented mentoring models emphasize empowering disadvantaged groups, recognizing diverse identities, and promoting inclusive practices. Emotional intelligence training, conflict management, reflective learning, and multimodal (online–face-to-face) mentoring formats are increasingly emphasized in mentor preparation.

**Table 8. Examination of Authentic and Transformational Leadership Styles in Education: Dimensions, Mechanisms, Comparative Analysis, and Future Directions (Based on Relevant Studies Indexed in Scopus)**

| Theme | Authentic Leadership (AL) | Transformational Leadership (TL) | Integrated/Comparative Perspectives |
|---|---|---|---|
| **Core Dimensions** | Self-awareness, relational transparency, internalized moral perspective, balanced processing | Idealized influence, inspirational motivation, intellectual stimulation, individualized consideration | Substantial construct overlap; complementary in some contexts |
| **Impact on Teachers** | Supports well-being, autonomy, and organizational commitment | Enhances innovation, self-efficacy, job satisfaction, and organizational commitment | Both styles positively influence job satisfaction and organizational citizenship behaviors; TL is generally stronger for innovation |
| **Mediators** | Autonomy, socio-emotional competence, organizational trust | Self-efficacy, collective efficacy, psychological safety, organizational culture | Organizational culture mediates both; emotional intelligence and self-efficacy interact more strongly with TL |
| **Measurement** | Authentic Leadership Questionnaire (ALQ), contextually adapted | Multifactor Leadership Questionnaire (MLQ-5X), GTLS | High correlation ($\rho \approx .72$); requires detailed, component-level differentiation |
| **Cultural Contexts** | Influenced by collectivism, cultural norms, and education policy | Similar, but TL tends to be more robust across contexts | Cross-cultural effects vary; more comparative research is needed |
| **Longitudinal/ Integrated Studies** | Rare; predominantly cross-sectional | Rare; predominantly cross-sectional | Significant gap in integrated, longitudinal studies |

## CONCLUSION

Authentic and transformational leadership represent two influential yet distinct approaches in educational leadership research. Their mechanisms differ-transformational leadership primarily drives innovation and engagement, while authentic leadership strengthens autonomy, trust, and ethical climate-yet they remain complementary in practice.

### Recommendations for Future Research

- Expansion of longitudinal, integrative studies addressing both leadership types together,
- Component-level comparative analyses,
- Cross-cultural comparisons in centralized vs. decentralized educational systems,
- Development of culturally sensitive and psychometrically robust measurement tools,
- Increased research on mentoring, teacher leadership, and social justice–centered leadership approaches.

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# BALANCING GENERAL ENGLISH AND ENGLISH FOR SPECIFIC PURPOSES IN TECHNICAL UNIVERSITIES

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**ABSTRACT**

The role of English instruction in technical universities has become a subject of ongoing debate: should curricula emphasize general language proficiency or specialized professional training? This study investigates the balance between English for General Purposes (EGP) and English for Specific Purposes (ESP) in technical higher education. EGP develops broad communicative competence, while ESP equips students with discipline-specific skills relevant to engineering, information technology, and oil and gas industries. Drawing on international practices from leading universities, the study highlights the value of a sequential, integrated approach: beginning with EGP to build foundational language skills, then introducing ESP to address specialized academic and professional needs. Methodologically, a qualitative document analysis of 12 international technical universities was conducted, including MIT, ETH Zurich, KAIST, and Tokyo Institute of Technology. The findings indicate that a balanced EGP-ESP curriculum enhances students' academic performance, professional readiness, and intercultural competence. Practical implications include guidance for language policy makers, curriculum designers, and instructors in technical universities, particularly in developing countries.

**Keywords:** English for General Purposes (EGP), English for Specific Purposes (ESP), technical universities, ESP curriculum, EGP-ESP integration, higher education, intercultural communication, needs analysis

## Introduction

With globalization, rapid technological advancement, and evolving labor-market demands, English instruction has become integral to technical universities (Basturkmen, 2010; Harmer, 2015; Richards, 2006). Graduates in engineering, information technology, oil and gas, and applied sciences are expected to possess both technical expertise and strong international communication skills (Flowerdew & Peacock, 2001; Hyland, 2006). Consequently, higher education institutions face a critical question: should English instruction emphasize English for General Purposes (EGP) or English for Specific Purposes (ESP)?

This study is motivated by professional experience and international collaboration. At Azerbaijan State Oil and Industry University (ASOIU), students encounter challenges balancing general language proficiency with discipline-specific requirements. Insights from the TEMPUS FLEPP project (Foreign Language Education for Professional Purposes), involving Azerbaijan, the UK, Estonia, Kyrgyzstan, Turkey, Turkmenistan, and Germany, demonstrate that an integrated EGP-ESP approach yields the most effective outcomes (Dudley-Evans & St. John, 1998; Hutchinson & Waters, 1987).

EGP enhances general language competencies—reading, writing, listening, speaking, and intercultural communication (Harmer, 2015; Richards, 2006), while ESP provides specialized skills for professional and academic contexts (Basturkmen, 2010; Dudley-Evans & St. John, 1998). Determining the optimal balance remains a critical task for technical universities worldwide.

## Aim

This study aims to determine the optimal balance between EGP and ESP in technical universities. Specifically, it addresses:

1. What are the individual benefits of EGP and ESP in technical higher education?
2. How do leading international universities implement EGP and ESP in their curricula?
3. How does a combined EGP-ESP model impact students' academic and professional preparedness?
4. What strategies can technical universities adopt to create an effective English curriculum addressing both general and discipline-specific needs?

## Significance

The study offers both theoretical and practical significance. First, it informs curriculum design, language policy, and teaching strategies for technical universities (Byram, 1997; Flowerdew & Peacock, 2001). Second, it highlights the need for integrated instruction, which enhances academic, professional, and intercultural

  

competencies. Third, by analyzing international best practices, it provides adaptable models for universities in developing countries. Finally, evidence from ASOIU demonstrates that sequential EGP-ESP instruction aligns with students' professional goals in global industries, particularly in oil and gas, engineering, and IT sectors.
Table 1 provides a clear side-by-side comparison of EGP and ESP, demonstrating why both are necessary in technical education.

***Table 1:*** **Comparison of EGP and ESP in Technical Education**

| ***Aspect*** | ***English for General Purposes (EGP)*** | ***English for Specific Purposes (ESP)*** |
|---|---|---|
| Focus | Broad communication skills | Discipline-specific communication |
| Skills Developed | Reading, writing, listening, speaking, intercultural competence (Harmer, 2015; Richards, 2006) | Technical vocabulary, report writing, presentations, professional discourse (Basturkmen, 2010; Dudley-Evans & St. John, 1998) |
| Examples | Academic essays, discussions, presentations | Engineering lab reports, oil & gas documentation, IT reports |
| Timing in Curriculum | Early semesters | Later semesters, aligned with specialization |
| Benefits | Foundational language proficiency, global adaptability | Professional readiness, academic success in specific fields |
| Challenges | Limited discipline-specific relevance | Cannot replace general language skills |

**Theoretical Framework**
The study is grounded in three main theoretical perspectives: Needs Analysis, Communicative Language Teaching (CLT), and ESP instructional models.

1. Needs Analysis: Hutchinson and Waters (1987) emphasize that assessing learners' needs is crucial in designing effective ESP programs. Understanding the specific contexts in which students will use English ensures that ESP courses are practical and relevant. This principle is especially applicable to technical fields such as oil and gas, engineering, medicine, marketing, and IT, where specialized vocabulary and communication conventions are essential.
2. Communicative Language Teaching (CLT): CLT advocates that language instruction should focus on communicative competence, not only grammatical accuracy. EGP programs aim to equip students with the ability to communicate effectively in social, academic, and professional contexts (Richards, 2006). Even technical professionals must write emails, participate in meetings, follow global news, and interact across cultures. Leading institutions, such as KAIST and MIT, ensure that all undergraduates take general English courses that include presentations, discussions, reading, writing, and listening, reinforcing the ongoing importance of general English.
3. ESP Models: Dudley-Evans and St. John (1998) describe ESP as a flexible, learner-centered approach that addresses discipline-specific communication needs. For example, students in oil and gas engineering must master vocabulary and tasks related to drilling operations, offshore platforms, seismic analysis, reservoir modeling, and safety protocols. Marketing students, in contrast, must understand marketing strategy, consumer behavior, campaign planning, and business proposal writing. ESP instruction enables students to perform effectively in real professional contexts, bridging the gap between general proficiency and field-specific demands.

This theoretical framework underlines the complementary nature of EGP and ESP and supports the integration of both approaches in technical university curricula.

**Literature Review**
EGP strengthens foundational language skills, preparing students for global communication (Harmer, 2015; Nation, 2013). ESP provides specialized skills essential for professional contexts, enabling students to interpret technical texts and communicate effectively (Basturkmen, 2010; Jordan, 2018).

International best practices favor a sequential approach: students begin with EGP, then progress to ESP modules (MIT, ETH Zurich, KAIST, Tokyo Institute of Technology) (Jordan, 2018; Swales, 1990). Observations from the TEMPUS FLEPP project confirm that ESP cannot succeed without a solid general English foundation, emphasizing collaboration between language instructors and subject-matter experts (Byram, 1997; Flowerdew & Peacock, 2001).

Despite abundant literature on EGP and ESP individually, there is limited guidance on systematically balancing both approaches, which this study addresses.

  

**Methodology**

**Research Design:** Qualitative, descriptive, and analytical.

**Sample:** 12 internationally recognized technical universities (MIT, ETH Zurich, KAIST, Tokyo Institute of Technology, Technical University of Munich). Universities were selected based on global ranking, availability of curricular documentation, and English-medium instruction.

**Inclusion Criteria:** Universities offering undergraduate technical programs with both EGP and ESP modules.

**Data Collection:** Curriculum documents, accreditation reports, official university websites, and peer-reviewed literature.

**Analytical Framework:** Thematic analysis identified patterns in EGP and ESP integration, sequencing, and instructional strategies. Codes were developed for foundational skills, discipline-specific modules, instructional methods, and assessment practices.

**Reliability and Validity:** Triangulation was achieved by cross-verifying curricula with academic literature. Two independent researchers reviewed coding and categorization for consistency.

**Findings**

1. **Integrated Sequential Models Predominate:** ~80% of universities follow EGP-first, ESP-later curricula.
2. **EGP Builds Foundational Competencies:** Courses target reading, writing, listening, speaking, presentations, discussions, and intercultural communication (Harmer, 2015; Richards, 2006).
3. **ESP Prepares Students for Professional Contexts:** Modules focus on technical report writing, data interpretation, project presentations, and discipline-specific terminology (Basturkmen, 2010; Dudley-Evans & St. John, 1998).
4. **Balanced Programs Yield Optimal Results:** Sequential EGP-ESP curricula enhance academic performance, professional readiness, and global competence.
5. **Evidence from ASOIU:** Early semesters focus on EGP; later semesters incorporate ESP aligned with engineering, oil and gas, IT, business programs etc.

**Discussion**

Findings align with prior research (Basturkmen, 2010; Hutchinson & Waters, 1987; Richards, 2006). A purely EGP or ESP focus is insufficient; sequential integration maximizes both linguistic and professional outcomes.

Internationally, ETH Zurich and KAIST show that authentic, discipline-specific tasks improve students' engagement and preparedness (Jordan, 2018). ESP courses should incorporate real-world documents, technical diagrams, and field-specific communication. Collaboration between language and subject-matter instructors ensures relevance (Flowerdew & Peacock, 2001; Dudley-Evans & St. John, 1998).

In technical fields, graduates must navigate complex professional environments. Balanced EGP-ESP instruction enhances their ability to understand technical documentation, participate in global discourse, and adapt to evolving industry demands.

**Conclusion**

This study confirms that the most effective English instruction in technical universities combines EGP and ESP. Students should first develop general language competencies and progressively engage with discipline-specific ESP modules. This approach:

- Strengthens academic and professional skills
- Enhances global communication competence
- Supports lifelong learning
- Prepares graduates for multicultural, technical professional environments

Integrating EGP and ESP provides a practical, research-supported solution for curriculum design in technical higher education.

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# DIFFERENCE OF PRINCIPLES AND VALUES WITHIN THE ORGANIZATION: AN ARTIFICIAL INTELLIGENCE–SUPPORTED MIND MAP MODEL

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**ABSTRACT**

This study proposes an artificial intelligence–supported mind-mapping model designed to enhance organizational learning and improve the internalization of corporate principles and values. Traditional value statements often remain static and fail to transform into actionable behaviors; therefore, organizations require technology-driven mechanisms that support shared understanding and continuous learning. The proposed model integrates four stages. First, existing organizational values are reviewed and redefined through strategic and participatory processes. Second, a Fuzzy Analytical Hierarchy Process (FAHP) is employed to determine value hierarchies and priorities using pairwise comparison matrices, providing a measurable decision-making structure. Third, qualitative and quantitative data from employees are analyzed to generate AI-supported mind maps that visualize how different groups perceive and interpret institutional values. These mind maps serve as a digital learning environment that strengthens awareness, reflection, and alignment. In the fourth stage, FAHP outputs, mind-map data, and employee insights are integrated to evaluate the coherence between value statements and organizational behavior. The findings demonstrate the potential of AI-based visualization tools to facilitate value-driven learning, reinforce organizational culture, and support technology-enhanced professional development. Recommendations for future research and practical applications in educational and organizational contexts are provided.

**Keywords:** Artificial intelligence**,** Organizational learning**,** Mind mapping**,** Value internalization**,** FAHP**,** Educational technology

## 1. Introduction

The sustainable success of organizations depends not only on strategic planning and operational efficiency but also on the alignment of shared principles and values within the institution. However, in modern organizations, the diversity of departments, employee groups, and leadership approaches often leads to differences in how these values are perceived and enacted. While such differences may threaten the coherence of organizational culture, when managed effectively, they can also generate innovative synergy.

In recent years, developments in digital transformation and artificial intelligence technologies have introduced new approaches to understanding and managing value differences within organizations. In particular, mind map models serve as powerful tools for visualizing complex relationships and systematically revealing diverse perspectives. AI-supported mind maps enable more transparent analysis of value conflicts, alignment points, and potential risk areas within organizations. Digital transformation therefore represents not only the adoption of technological tools but also the restructuring of organizational learning processes. Dörner and Rundel (2021) emphasize that digital transformation creates both crises and opportunities for organizational learning by establishing reciprocal learning relationships between individuals and institutions. In this context, digital transformation processes require organizations to develop flexible, adaptive, and continuously learning structures.

The internalization of organizational values by employees is a critical factor in ensuring the sustainability of organizational culture. Harvey, Osman, and Tourky (2021) argue that internalized values guide employee behavior and directly influence an organization's reputation among external stakeholders. When values are internalized, employees are more likely to act with ethical awareness and a sense of responsibility in their decision-making processes, thereby enhancing the quality of organizational learning.

Educational technologies make significant contributions to organizational learning by accelerating knowledge sharing and facilitating collaboration. Leigh (2024) demonstrates that digital learning tools transform

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organizational culture, increase employee engagement, and support a culture of continuous learning. The effective use of educational technologies strengthens organizations' openness to change and their innovative capacity.

More recently, AI-supported models have emerged as a new paradigm in organizational learning. AI-based mind maps facilitate the visualization of complex information, enabling employees to establish conceptual connections more rapidly. As of 2025, it has been reported that AI-driven mind-mapping tools enhance team collaboration and improve efficiency in learning processes (Smith, 2025). By making value differences within organizations more visible, these tools help create a shared learning environment.

The aim of this study is to design an AI-supported mind map model that contributes to organizational learning and enables a more transparent analysis of differences in organizational principles and values. By integrating the opportunities offered by digital transformation with the internalization of ethical values, the proposed model seeks to support organizations in developing a sustainable learning culture.

## 2. Literature Review

Organizational learning is a multidisciplinary field that explains the transformation of individual knowledge into organizational knowledge and proposes practical approaches across the interconnected dimensions of people, processes, and technologies. In their comprehensive study, Basten and Haamann (2018) synthesized 18 organizational learning approaches and demonstrated how learning is positioned within organizational transformation, offering applicable frameworks across people-oriented (seven), process-oriented (nine), and technology-oriented (two) domains. In the context of higher education, scholars emphasize the diversification of organizational learning theories and the use of institution-specific paradigms, highlighting that the learning organization approach plays a guiding role in institutional change processes within universities (Dee & Leišytė, 2016).

Value-based leadership is a key determinant in shaping a culture that supports sustainable organizational change. Purnomo and Ausat (2024) show that, in dynamic business environments, value-based leadership transforms organizational culture, ensures continuity in change management, and strengthens stakeholder trust. At the intersection of organizational psychology and management theory, the work of Küçük Yılmaz and Flouris (2019) provides an interdisciplinary framework that systematically discusses the functions, dynamics, and organizational impact of values. Similarly, Mueller and Straatmann (2014) emphasize how values can be embedded into managerial mechanisms to foster integration and enhance organizational well-being, thereby contributing new momentum to research on organizational values.

Artificial intelligence has the potential to accelerate access, inclusivity, and lifelong learning in education. At the same time, the rapid development of AI poses the risk of outpacing existing policies and regulations, necessitating governance approaches grounded in human-centered principles and equity. Recent studies indicate that AI integration enriches learning quality, creativity, and individualized support mechanisms, while also highlighting the need for balanced governance that addresses both benefits and challenges (Garzón et al., 2025). Contemporary reviews on the role of AI in transforming learning environments further demonstrate that, alongside goals such as improving access and reducing disparities, the institutionalization of ethical principles in the design and implementation of AI systems is critical (Mariyono & Nur Alif, 2025).

Mind mapping is a learning tool that reduces cognitive load by visualizing conceptual relationships and supporting processes such as idea generation, note-taking, organization, and concept development. Meta-analytic evidence evaluating the effects of mind map–based instruction on cognitive learning outcomes reveals mixed results, indicating that design quality and implementation context significantly influence effect size (Shi et al., 2023). Systematic reviews suggest that mind maps support structured thinking and conceptual bridging in algorithmic and procedural learning contexts (Kefalis et al., 2025). Experimental studies further demonstrate that mind mapping in programming education can enhance learners' computational thinking skills and self-efficacy, thereby facilitating learning transfer in complex knowledge domains (Guo et al., 2024).

Multi-criteria decision-making (MCDM) methods enable transparent, comparative, and consistent decision-making in complex real-life problem areas such as education and human resource management. A systematic review of MCDM approaches in higher education indicates that criterion weighting and alternative comparison are effective in jointly evaluating program, instructional, and environmental components (Yüksel et al., 2023). In the context of organizational leadership selection, FAHP applications enhance the reliability of decision-making processes by systematically integrating difficult-to-measure competencies such as cross-cultural intelligence and

  

crisis management (Timi et al., 2025). Although FAHP is widely used in academic research, studies specifically applying FAHP to the evaluation of organizational principles and values remain limited. Nevertheless, relevant applications can be found within the broader domains of human resource management and organizational learning (e.g., Salehzadeh & Ziaeian, 2024).

Despite the growing body of literature on organizational learning, value-based leadership, artificial intelligence in education, and mind mapping techniques, existing studies largely address these domains in isolation. Empirical applications that integrate AI-supported visualization tools with multi-criteria decision-making methods to analyze differences in organizational principles and values remain limited. In particular, the use of FAHP combined with AI-supported mind mapping as a learning-oriented analytical model has not been sufficiently explored. This study addresses this gap by proposing an integrated model that makes value differences visible and supports organizational learning processes.

## 3. Method

The Analytic Hierarchy Process (AHP), developed by Thomas Saaty (1977), is a decision-making method that transforms complex problems into a hierarchical structure. Decision-makers define criteria and sub-criteria and then determine their relative importance through pairwise comparisons.

The AHP process can be summarized in the following steps:

- **Problem definition:** Clearly defining the decision problem and its objectives.
- **Hierarchy construction:** Identifying criteria and sub-criteria and structuring the decision problem into a hierarchical model consisting of the main goal at the top, followed by criteria and sub-criteria at lower levels.
- **Pairwise comparisons:** Conducting pairwise comparisons at each level of the hierarchy to evaluate the relative importance of criteria.
- **Priority calculation:** Calculating priority weights using pairwise comparison matrices and checking consistency to ensure reliable results.
- **Synthesis of results:** Aggregating priority weights to determine the overall ranking of alternatives.

The Fuzzy Analytic Hierarchy Process (FAHP) extends classical AHP by modeling uncertainty in human judgments through fuzzy numbers, thereby producing more reliable results. Instead of requiring precise numerical judgments, FAHP allows decision-makers to use linguistic scales, enabling more natural and realistic evaluations. While preserving the strengths of classical AHP, FAHP more effectively captures uncertainty, making it particularly suitable for assessing abstract criteria such as ethical values, cultural differences, and educational contexts. For this reason, FAHP is considered more appropriate than classical AHP for analyzing differences in organizational principles and values.

The proposed model consists of four stages. First, existing organizational values and principles are reviewed and redefined or updated in line with strategic objectives, stakeholder expectations, and prevailing cultural dynamics. Second, pairwise comparison matrices are developed, and value priorities are analyzed using the Fuzzy Analytic Hierarchy Process (FAHP) to establish a more objective and measurable weighting structure. Third, qualitative and quantitative data are collected from employees, and AI-supported mind maps are generated to visualize how different organizational groups perceive, interpret, and apply organizational values. This stage also functions as an internal awareness and learning mechanism that supports cultural transformation. In the fourth stage, FAHP results, mind map outputs, and employee feedback are analyzed together in an integrated evaluation process to identify the level of alignment between organizational values and employee behaviors.

**Step 1:** In the sample application, organizational values and principles were reviewed, and five core values were identified. The definitions of these values and principles were also re-examined.

**Step 2:** Pairwise comparison matrices were constructed (Table 1). Levels of importance (Very Important, Important, Moderately Important, Less Important, and Equal) were assessed by employees at different hierarchical levels. Separate participant groups were formed for senior management, middle management, and employees.

**Step 3:** This stage involved the implementation of the assessment process. Prior to data collection, participants reviewed and read the definitions of organizational values and principles to ensure informed and focused decision-

  

making. This stage also functioned as a learning phase in which employees reflected on organizational values and engaged in value-based judgment and decision-making.

| | VI | I | MI | LI | E | LI | MI | I | VI | |
|---|---|---|---|---|---|---|---|---|---|---|
| Value 1 | | | | | | | | | | Value 2 |
| Value 1 | | | | | | | | | | Value 3 |
| Value 1 | | | | | | | | | | Value 4 |
| Value 1 | | | | | | | | | | Value 5 |
| Value 2 | | | | | | | | | | Value 3 |
| Value 2 | | | | | | | | | | Value 4 |
| Value 2 | | | | | | | | | | Value 5 |
| Value 3 | | | | | | | | | | Value 4 |
| Value 3 | | | | | | | | | | Value 5 |
| Value 4 | | | | | | | | | | Value 5 |

*Table 1. Pairwise comparison matrix*

**Step 4:** The collected data, expressed through linguistic judgments, were first converted into fuzzy numbers in accordance with AHP consistency requirements. Following the FAHP procedure, priority weights were calculated. The fuzzy comparison matrices of each participant group were then aggregated using geometric means to obtain a single weight value for each group. As a result, a distinct set of weights was generated for each hierarchical group.

## 4. Findings

The analysis indicates that the prioritization of organizational values differs significantly across hierarchical levels within the organization. These differences reveal distinct value orientations among senior managers, managers, and employees.

**Table 2** presents the FAHP-derived weight values of the five organizational values for each hierarchical group. The results demonstrate that value priorities are not uniformly distributed across the organizational structure.

*Table 2. Distribution of organizational values across hierarchical levels*

| **Values** | **Senior Managers** | **Managers** | **Employees** | **Everyone** |
|---|---|---|---|---|
| Value 1 | 0.276273658 | 0.090573987 | 0.17387336 | 0.101671 |
| Value 2 | 0.111385144 | 0.151359969 | 0.2354248 | 0.249573 |
| Value 3 | 0.209377431 | 0.343310677 | 0.09013501 | 0.204900 |
| Value 4 | 0.230430062 | 0.343310677 | 0.40135203 | 0.363561 |
| Value 5 | 0.172533705 | 0.07144469 | 0.0992148 | 0.080295 |
| **Total** | **1.000** | **1.000** | **1.000** | **1.000** |

The priority rankings of organizational values are summarized in **Table 3**. Senior managers primarily prioritize **Value 1**, whereas managers emphasize **Value 3 and Value 4**. Employees predominantly prioritize **Value 4**, which also emerges as the most prominent value across all participants.

This distribution suggests a closer alignment between managers and employees in terms of organizational value perceptions, while senior management displays a distinct prioritization pattern.

  

*Table 3. Hierarchical prioritization of organizational values*

| Priority | Senior Managers | Managers | Employees | Everyone |
|---|---|---|---|---|
| 1 | Value 1 | Value 3–4 | Value 4 | Value 4 |
| 2 | Value 4 | Value 3–4 | Value 2 | Value 2 |
| 3 | Value 3 | Value 2 | Value 1 | Value 3 |
| 4 | Value 5 | Value 1 | Value 5 | Value 1 |
| 5 | Value 2 | Value 5 | Value 3 | Value 5 |

**Table 3** provides a mathematical mapping of participants' perceptions of organizational values and principles, illustrating how value priorities are cognitively positioned across hierarchical levels.

## 5. Discussion

The findings of this study demonstrate clear hierarchical differences in the prioritization of organizational values, indicating that organizational principles are not uniformly perceived or internalized across different levels of the hierarchy. Such differentiation supports the view that organizational learning and value alignment are dynamic processes shaped by positional roles and daily practices rather than static institutional statements. This observation is consistent with organizational learning literature emphasizing the role of context and hierarchical positioning in shaping sense-making and learning processes within organizations (Basten & Haamann, 2018).

The relatively closer alignment observed between managers and employees, particularly in the prioritization of **Value 4**, may reflect shared operational experiences and interaction patterns. In contrast, the distinct prioritization patterns of senior management suggest that strategic-level interpretations of organizational values may diverge from those at operational levels. This finding aligns with studies on value-based leadership, which highlight that leadership perspectives significantly influence how values are framed, communicated, and enacted within organizations (Purnomo & Ausat, 2024; Küçük Yılmaz & Flouris, 2019).

From an organizational learning and digital transformation perspective, the integration of FAHP with AI-supported mind mapping provides a structured mechanism for making implicit value differences visible and open to reflection. Consistent with recent research on artificial intelligence in learning environments, this approach supports reflective learning by transforming subjective judgments into visual and analyzable representations (Garzón et al., 2025; Mariyono & Nur Alif, 2025). By enabling organizations to identify areas of alignment and divergence, the proposed model contributes to the development of shared understanding and supports continuous learning processes.

## 6. Conclusion and Recommendations

The proposed model offers a flexible and transferable framework that can be applied across organizations of different sizes and sectors. During the implementation process, organizational values and principles require deliberate reflection and discussion by employees, fostering deeper engagement with institutional norms. This process not only supports structured decision-making mechanisms but also creates an organizational learning environment that enhances ethical awareness among employees.

The findings of the study demonstrate that implicit perceptions of organizational values can be systematically made visible and transformed into explicit and measurable information. This transformation enables organizations to identify both their cultural strengths and areas requiring improvement. In this respect, the proposed model provides a strategic contribution to organizational learning and cultural development processes by supporting value alignment, reflection, and continuous learning.

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# ECOLOGICAL SOLUTIONS TO ETHICAL DILEMMAS

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## ABSTRACT

This study examines the decision-making processes employed by students when addressing ecology-related ethical dilemmas. A descriptive qualitative research design was employed to analyze students' written, verbal, and visual responses to scenario-based ethical dilemmas with a focus on sustainability, environmental responsibility, and social welfare. Data were collected through video recordings, researcher observations, written justifications, and student drawings produced during the instructional implementation. Descriptive analysis revealed that engagement with ecological ethical scenarios supported students' ethical reasoning, critical thinking, and perspective-taking skills. The findings further indicated that students demonstrated varying levels of ethical awareness, responsibility, and socio-ecological sensitivity depending on the complexity and contextual demands of the dilemmas presented. The study concludes that ecological ethical dilemmas constitute a meaningful instructional tool for fostering environmental awareness and ethical decision-making skills. Recommendations are provided for the systematic integration of ecological ethics into educational settings.

**Keywords**: ecological ethics; ethical dilemma; ecological awareness; sustainability; scenario-based learning

## INTRODUCTION

Ethical dilemmas emerge when individuals are confronted with two or more moral obligations that cannot be fulfilled simultaneously, requiring a decision that inevitably compromises at least one ethical principle. For an ethical dilemma to exist, three essential conditions must be present: a decision-maker, multiple alternative courses of action, and the moral cost associated with each of these alternatives. Such situations generate unavoidable moral tension and complexity in decision-making processes (Allen, 2012; McConnell, 2020).

Ecological problems cannot be reduced to technical challenges alone, as they are deeply rooted in human behavior and cultural values (Kals & Müller, 2010). In this regard, the ecological crisis can be understood not merely as an environmental phenomenon but as a fundamentally human one. As Mueller (2009) emphasizes, "the ecological crisis is not so much ecological as it is human," highlighting the central role of human values, decisions, and responsibilities in shaping environmental outcomes. Environmental and sustainability education increasingly requires engagement with ethical dimensions, as environmental issues are closely intertwined with social and human development concerns (Öhman, 2016). Contemporary social, cultural, and environmental transformations increasingly challenge individuals' capacity to sustain a balanced understanding of ethical responsibility (Gardner, Csikszentmihalyi, & Damon, 2001; Gardner, 2006). In particular, the escalation of environmental problems has underscored the need to extend ethical decision-making beyond human-centered concerns to include ecological dimensions. Ethical reasoning related to environmental issues requires individuals to position themselves within an interconnected ecosystem and to recognize the consequences of human actions on the natural world. According to Kronlid and Öhman (2013), environmental and sustainability education increasingly positions ethical dilemmas at the core of learning processes, as new generations are expected to confront complex moral challenges related to ecological crises.

Ecological awareness is closely associated with practices that promote responsibility toward nature, such as conserving resources, reducing waste, and understanding fundamental ecological processes (Climate Sustainability Directory, n.d.). Sustainability, as a multidimensional concept, emphasizes the need to maintain balance among environmental, social, and economic systems (UCLA Sustainability, n.d.). Achieving a sustainable future depends on establishing harmonious relationships between human societies and natural ecosystems (U.S. Environmental Protection Agency, n.d.).

  

Within educational contexts, the integration of ethics and sustainability has been supported by various theoretical frameworks. Gardner's Five Minds for the Future provides a particularly relevant perspective by emphasizing disciplined, synthesizing, creative, respectful, and ethical modes of thinking (Gardner, 2006). These cognitive and moral domains offer significant potential for fostering ethical sensitivity and ecological awareness, especially during childhood and adolescence.

Empirical studies have demonstrated that instructional approaches such as scenario-based learning, role-playing, and discussions of ethical dilemmas can effectively support students' ethical reasoning and sustainability-oriented thinking. Research indicates that such approaches encourage empathy, perspective-taking, and evidence-based reasoning in relation to environmental and socio-ecological issues (Bielefeldt, 2011; Esquivel-Martín et al., 2023; Rahmawati et al., 2021; Schrier, 2015). Despite this growing body of literature, studies that simultaneously examine children's ethical decision-making processes, ecological awareness, and affective responses through multiple data sources remain limited. In particular, there is a need for research exploring applications of ecological ethical dilemmas that integrate written responses, discussions, drawings, and role-playing activities.

Accordingly, the present study aims to examine how scenario-based applications grounded in ecological ethical dilemmas influence primary and secondary school students' ethical reasoning, environmental awareness, and perceptions of responsibility.

## METHOD

### Research Design

A descriptive qualitative research design was employed to explore students' decision-making processes, ethical reasoning patterns, and interpretive meanings within the context of ecological ethical dilemmas. This design enabled an in-depth examination of students' cognitive and affective responses to scenario-based ethical challenges.

### Participants

The study group comprised sixteen volunteer primary and secondary school students representing different age groups and grade levels. This diversity allowed for comparative insights into ethical decision-making processes across developmental stages.

### Data Collection

Data were collected using multiple qualitative data sources, including ecological ethical dilemma scenarios, students' written justifications, drawings, video recordings of instructional sessions, and researcher observation notes. The instructional implementation was conducted in four stages:

1. Students were assigned professional roles aligned with the scenario context (e.g., CEO, surgeon, engineer, investment banker).

2. An ecological ethical dilemma scenario was presented.

3. Group discussions were conducted to facilitate collective reasoning.

4. Students produced written responses and/or drawings reflecting their ethical decisions.

### Data Analysis

All student products were evaluated using an analytic rubric specifically developed to assess ecological ethical reasoning. The rubric consisted of five criteria—problem comprehension, thinking strategies, metacognitive awareness, solution generation and creativity, and expression skills—across four performance levels, yielding a total score of 20 points. Descriptive analysis was employed to categorize written responses, drawings, and observation notes into themes related to ethical sensitivity, ecological awareness, and justification patterns.

## FINDINGS

The findings of the study were organized under five main themes derived from the descriptive analysis of students' written responses, group discussions, drawings, and role-playing activities. These themes reflect how students

  

reasoned about ecological ethical dilemmas and how they articulated their decisions across different modes of expression.

1. Ethical Justification

A majority of the students demonstrated a clear tendency to justify their decisions when confronted with ecological ethical dilemmas. Analysis of their responses revealed three primary forms of ethical justification. First, outcome-oriented justifications were frequently observed. Students emphasized reducing harm to the environment, protecting the right of living beings to exist, and considering the broader social consequences of decisions. These justifications were often framed in terms of minimizing negative environmental impact and preventing long-term damage to ecosystems. Second, principle-based justifications were grounded in moral rules and ethical norms. Students referred to general principles such as "nature should not be harmed," "waste is wrong," and "one should act fairly and honestly." These statements indicate that students relied on internalized ethical rules rather than situational benefits alone when evaluating dilemmas. Third, emotion-centered justifications reflected affective responses such as empathy, conscience, sadness, or feelings of guilt. In these cases, students explained their decisions by expressing concern for living beings or discomfort with causing harm. Taken together, these findings indicate that students evaluated ecological ethical dilemmas using both cognitive and affective dimensions, integrating rational reasoning with emotional sensitivity.

2. Responsibility and Social Benefit

Responsibility emerged as one of the most salient themes in students' responses. Students frequently emphasized the necessity of taking responsibility not only at the individual level but also at the societal level. Many participants articulated an awareness of shared responsibility for protecting common living spaces such as nature, water resources, and public environments. Students also highlighted the idea of social benefit, stating that decisions should prioritize "what is best for society" rather than personal gain. References to the common good suggest that ethical dilemmas encouraged students to move beyond self-centered reasoning and to consider collective outcomes. This theme indicates that ecological ethical dilemmas can activate social consciousness and foster an understanding of shared ethical obligations.

3. Ecological Sensitivity

The analysis revealed strong indicators of ecological sensitivity in students' evaluations of ethical dilemmas. Across written and oral responses, students frequently mentioned the importance of protecting nature, reducing water and energy waste, and managing waste responsibly. Students also referred to the interdependent relationship between humans and nature, emphasizing that harm to the environment ultimately affects all living beings. These expressions demonstrate an awareness of ecological balance and sustainability. The findings suggest that when ethical dilemmas are presented through concrete and relatable scenarios, students' ecological awareness becomes more visible and articulated.

4. Themes in Drawings

Student drawings provided additional insight into how learners conceptualized ecological ethical issues. Three dominant themes emerged from the visual data. The first theme was human–nature relationships, depicted through images of trees, animals, water sources, and humans interacting within shared environments. The second theme focused on environmental threats, such as pollution, drought, waste accumulation, and damaged ecosystems. These drawings often conveyed a sense of environmental degradation and risk.The third theme involved solution-oriented representations, including recycling bins, water-saving practices, tree planting, and symbols of environmental protection. The drawings indicate that students were able to translate abstract ethical reasoning into concrete visual forms and to use visual thinking as a means of understanding and expressing environmental problems.

5. Effects of Role-Playing

Role-playing activities played a significant role in supporting students' ethical decision-making processes. Findings indicate that students learned to adopt different perspectives by internalizing the viewpoints required by their assigned roles. Assuming roles such as CEO, surgeon, engineer, or investment specialist enabled students to evaluate ethical dilemmas within the context of professional responsibilities, societal impact, and personal values. The role-playing process encouraged students to consider the consequences of decisions from multiple angles rather than relying on a single viewpoint. Additionally, the discussion environment created through role-playing allowed students to listen to their peers' perspectives, compare alternative arguments, and restructure their own

  

reasoning. These findings suggest that role-playing fosters perspective-taking, reflective thinking, and collaborative ethical reasoning in the context of ecological dilemmas.

## DISCUSSION

Socio-ecological dilemmas require individuals to engage in moral judgment processes that extend beyond rational cost–benefit calculations (Kals & Müller, 2010). The findings of the present study indicate that ecological ethical dilemmas provide a rich pedagogical context in which students engage in both cognitive reasoning and affective evaluation. Students' justifications reflected a combination of consequence-based reasoning, principle-oriented ethical considerations, and emotion-centered explanations, suggesting that even at early educational levels learners are capable of integrating rational judgment with empathy, moral values, and social awareness when confronted with ecologically grounded ethical dilemmas. The observed need for ethical justification reflects the inherently normative nature of sustainability-related decision-making (Öhman, 2016), while moral emotions such as empathy and responsibility play a central role in motivating sustainable behavior (Kals & Müller, 2010). This finding resonates with the argument that ethical learning is most effectively fostered through dilemmas characterized by genuine uncertainty and competing values. As Gurr and Forster (2023) emphasize, normative case studies aim to promote ethical reasoning by engaging learners with genuine uncertainty, competing values, and contextually grounded dilemmas that have not yet reached a social 'tipping point'. Ethical awareness toward ecosystem sustainability emerges primarily from internalized moral values and a sense of collective responsibility rather than from externally imposed rules or sanctions (Balontia, 2024). In line with this view, Żeber-Dzikowska et al. (2016) emphasize that ethical responsibility in environmental contexts is primarily grounded in individuals' internal value systems, moral sensitivity, and sense of responsibility rather than in external rules or sanctions. Environmental ethics functions as a core instrument within education for sustainable development by framing human–nature relationships in terms of moral responsibility, shared values, and ethical accountability rather than purely instrumental or anthropocentric considerations (Nasibulina, 2015). From this perspective, ecological ethical dilemmas engage learners with the interconnected social and ecological dimensions of sustainability by re-actualising long-standing ethical questions and reflecting the ethical and political challenges of contemporary environmental education (Öhman, 2016). Accordingly, such dilemmas can be understood not merely as instructional tools, but as intellectual frameworks that enable students to analyse and respond to morally complex sustainability-related problems (Kronlid & Öhman, 2013).

Ethical dilemmas related to sustainability inherently involve conflicts between ecological, social, and economic values, requiring a justice-oriented evaluation (Kals & Müller, 2010). One prominent theme emerging from the data was students' strong sense of responsibility and orientation toward social benefit. Participants frequently articulated the importance of acting not only in their own interest but also in consideration of collective well-being and shared environmental resources. This finding aligns with previous research emphasizing that ethical dilemmas related to sustainability can foster a sense of moral responsibility and encourage learners to consider the broader societal and environmental consequences of their decisions (Bielefeldt, 2011). The emphasis on "doing what is best for society" indicates that ethical dilemma-based instruction may support the development of civic consciousness and common-good reasoning alongside individual moral judgment.

Students also demonstrated a high level of ecological sensitivity across written responses, discussions, drawings, and role-playing activities. References to nature conservation, reduction of waste, responsible use of water and energy, and the interdependence between humans and the natural environment were consistently observed. These findings support the argument that ecological awareness is strengthened when abstract ethical issues are embedded in concrete, relatable scenarios. In this respect, the results are consistent with Esquivel-Martín et al. (2023), who found that One Health–based scenarios enabled students to reason more holistically about the interconnectedness of human, animal, and environmental health. Similarly, in the present study, students' justifications often reflected an integrated understanding of ecological systems and social responsibility.

The analysis of student drawings further revealed that learners were able to translate abstract ethical reasoning into concrete visual representations. Themes such as human–nature relationships, environmental threats, and solution-oriented actions (e.g., recycling, water conservation, reforestation) suggest that visual expression served as a meaningful medium for ethical and ecological sense-making. These findings highlight the value of multimodal data sources in capturing students' ethical thinking processes and support calls in the literature for research designs that move beyond single-method approaches when examining children's ethical decision-making.

  

Role-playing emerged as a particularly influential instructional strategy in supporting students' ethical reasoning processes. By assuming roles such as engineers, surgeons, CEOs, or investors, students were encouraged to adopt diverse perspectives and to evaluate ethical dilemmas within the context of professional responsibility, societal impact, and personal values. This finding is consistent with Schrier's (2015) work, which demonstrated that role-playing–based sustainability scenarios enhance empathy, perspective-taking, and ethical justification. In the present study, the role-playing process similarly enabled students to reconsider their initial positions, compare alternative viewpoints, and refine their ethical decisions through dialogue and reflection.

The observed outcomes are also in line with Rahmawati et al. (2021), who emphasized the pedagogical value of ethical dilemma narratives in promoting value clarification, collaboration, and sustainability-oriented decision-making. Students' engagement in respectful discussion, collective reasoning, and shared problem-solving in this study further supports the notion that ethical dilemmas function as social learning tools that strengthen cooperative learning and moral discourse.

From a theoretical perspective, the findings can be interpreted through the lens of Gardner's (2006) Five Minds for the Future framework. Evidence of the ethical mind and respectful mind was apparent in students' concern for fairness, responsibility, and empathy, while the synthesizing mind was reflected in their ability to connect environmental, social, and individual dimensions of ethical issues. Additionally, the creative mind manifested in students' solution-oriented proposals and imaginative representations of sustainable practices. Taken together, these results suggest that ecological ethical dilemmas offer holistic learning opportunities that simultaneously engage multiple dimensions of moral, cognitive, and ecological development.

Overall, when considered alongside existing literature, the findings of this study suggest that ecological ethical scenarios represent an effective instructional approach for fostering ethical reasoning, environmental awareness, and responsibility consciousness in children. Integrating ethics and ecology within educational practice may contribute to the development of interdisciplinary thinking skills and value-based decision-making processes, supporting learners in becoming ethically informed and environmentally responsible citizens.

## CONCLUSION

The findings indicate that instructional activities based on ecological ethical dilemmas contribute to the development of holistic ethical perspectives among children. The ecological ethics approach implemented in this study enabled students to engage with environmental issues not merely at a cognitive level, but through moral reasoning, empathy, and a sense of social responsibility. This is particularly important given that the harmonious development of economic, social, and environmental systems requires a sound understanding of sustainability grounded in ethical action. Conceptualizing sustainability within an ethical framework necessitates consideration not only of the technical dimensions of environmental problems, but also of their underlying value-based aspects (Li & Wei, 2023). The findings of the present study suggest that activities grounded in ecological ethical dilemmas support the development of such a holistic perspective in children.

Within this context, the ecological ethical approach adopted in the study allowed students to evaluate environmental issues through multiple dimensions, including ethical justification, empathy, and societal responsibility. The integration of role-playing, group discussion, written explanations, and drawing activities enriched students' ethical decision-making processes at both cognitive and affective levels. This multimodal engagement provided students with opportunities to articulate, negotiate, and reflect upon their ethical positions in diverse ways. These findings are consistent with prior research demonstrating that role-playing games enhance ethical reasoning and empathy-based thinking (Schrier, 2015), and parallel studies indicating that scenario-based learning strengthens students' capacity to address human–animal–environment relationships in an integrated manner (Esquivel-Martín et al., 2023).

Furthermore, the results reinforce previous research highlighting the effectiveness of ethical dilemma–based learning environments in supporting students' value clarification, collaboration, and sustainability-oriented reasoning skills (Rahmawati et al., 2021). Students' tendency to perceive environmental protection as an ethical responsibility aligns with earlier findings suggesting that even short-term sustainability-focused interventions can foster an ethical orientation toward sustainability (Bielefeldt, 2011). Sustainability-oriented ethical awareness is strengthened when learners recognize ecosystem preservation as a shared moral obligation requiring cooperation among individuals, institutions, and society as a whole (Balontia, 2024). In this sense, ethical dilemma-based learning environments may help address the democratic challenge of promoting sustainability-related values while

  

preserving students' opportunities for free and reflective opinion formation (Öhman, 2016). In this respect, ecological ethical dilemmas appear to function as a powerful pedagogical tool for promoting both environmental awareness and ethical reasoning skills in educational contexts.

From a theoretical perspective, the findings also correspond with Gardner's Five Minds framework, particularly in activating ethical, respectful, synthesizing, and creative modes of thinking. Students demonstrated ethical sensitivity through moral justification and responsibility, respectful thinking through consideration of others and shared environments, synthesizing thinking through the integration of ecological, social, and individual factors, and creative thinking through solution-oriented proposals. According to Kals and Müller (2010), introducing sustainability principles at an early age and reinforcing them through ethical and experiential learning is essential for long-term impact. Overall, the integration of ecology and ethics in educational practice from an early age appears to support the development of value-based decision-making skills and to provide a meaningful foundation for students' active participation in the construction of a sustainable society.

## RECOMMENDATIONS

Ethical dilemma pedagogy should be systematically integrated into teacher education programs through practice-oriented training components. Pre-service teachers need structured opportunities to learn how to introduce, facilitate, and assess ethical dilemmas in classroom settings, as such competencies are essential for strengthening sustainability and ethics education.

Ecological ethics content may be systematically embedded across teacher education curricula, particularly within courses related to values education, science education, and social studies education. This interdisciplinary integration can support prospective teachers in developing a coherent understanding of sustainability as a value-based and ethical construct.

Instructional strategies such as role-playing, scenario-based learning, and case analysis should be used more frequently in teacher education. These methods can foster pre-service teachers' ethical reasoning and empathy skills and prepare them to implement similar practices in their future classrooms. Prior research indicates that role-playing and ethical dilemma–based pedagogies are particularly effective in enhancing ethical judgment, empathy, and collaborative reasoning (Schrier, 2015; Rahmawati et al., 2021).

Age-appropriate ecological ethical dilemmas should be designed for different grade levels and implemented through discussion, written responses, drawing activities, and group work. Using multiple modes of expression can help students articulate their ethical reasoning and ecological awareness more effectively.

To monitor students' decision-making processes, analytic rubrics may be employed to systematically assess ethical justification, responsibility awareness, and ecological sensitivity. Such assessment tools can support teachers in tracking students' developmental progress in ethical and sustainability-related competencies.

Classroom instruction should be enriched with examples drawn from students' immediate environmental contexts. Presenting realistic dilemmas connected to learners' local surroundings can increase relevance, promote meaningful engagement, and strengthen the connection between ethical reasoning and real-life environmental issues.

Future studies may adopt longitudinal research designs to examine the long-term effects of ecological ethics–based instruction on students' thinking patterns, values, and environmentally responsible behaviors. Such studies would provide insight into the sustainability of ethical learning outcomes over time.

Mixed-method research designs, combining quantitative and qualitative approaches, could offer a more comprehensive understanding of students' ethical reasoning processes and decision-making strategies. Integrating multiple data sources may help capture both cognitive and affective dimensions of ethical development.

Additionally, ecological ethical dilemmas may be integrated into digital and game-based learning environments, including serious games or augmented reality applications. Exploring the use of technological approaches in conjunction with ethical dilemma pedagogy could contribute to the development of innovative instructional models for sustainability and ethics education.

  

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# ENHANCING LEARNING FOR STUDENTS WITH DOWN SYNDROME THROUGH ASSISTIVE TECHNOLOGIES

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**ABSTRACT**
This study explores the transformative potential of assistive technologies (AT) in improving learning outcomes for students with Down syndrome (DS). Rapid advancements in digital innovation—ranging from speech-generating devices to adaptive educational applications—are creating more inclusive learning environments for students with intellectual disabilities. This research integrates international experiences and local perspectives from Azerbaijan to investigate the impact of AT on communication, cognitive engagement, and emotional development. Drawing on the resources of the Down Syndrome Association of Greater St. Louis (DSAGSL, 2024), the paper highlights practical examples of AT use in supporting literacy, numeracy, and self-expression. A qualitative-descriptive methodology was used, involving interviews with teachers and parents, classroom observations, and analysis of AT-supported interventions.

The findings suggest that tablet-based software, interactive whiteboards, and communication-focused apps such as *Speech Blubs*, *Proloquo2Go*, and *TouchChat HD* significantly enhance students' verbal skills, attention span, and motivation. In addition, visual scheduling systems, audiobooks, and task-sequencing tools reduce behavioral anxiety and support independent task completion. Teachers and parents reported that consistent AT usage promotes greater inclusion, autonomy, and participation in daily educational routines. However, the study also identified barriers such as limited training opportunities for educators, insufficient funding, and the lack of localized Azerbaijani-language AT resources.

The paper concludes that assistive technologies can bridge the gap between students' cognitive potential and academic demands when implemented through a systemic approach that involves training, collaboration, and policy support. To achieve sustainable inclusion, Azerbaijan's education system must foster digital equity, strengthen teacher competencies, and promote culturally adapted AT solutions tailored to students' linguistic and social contexts.

**Keywords:** Down Syndrome, Assistive Technology, Inclusive Education, Digital Inclusion, Azerbaijan

## INTRODUCTION

Down syndrome (DS) is a chromosomal condition—most commonly trisomy 21—associated with a distinctive developmental profile that can influence learning, communication, and participation in school settings. Many learners with DS experience difficulties in expressive language, sustained attention, and short-term or working memory, while often demonstrating relative strengths in visual processing, imitation, and social motivation (Kumin, 2019). This combination of challenges and strengths has important implications for instruction. In particular, educational approaches that rely heavily on verbal explanation or dense written materials may not fully match the learning needs of students with DS, whereas structured, visually supported and multisensory teaching can leverage areas of relative strength and increase engagement (Kumin, 2019).

Within this landscape, assistive technology (AT) has become an increasingly central component of inclusive education over the past two decades. AT refers to a broad continuum of tools and systems—ranging from low-tech supports (e.g., picture cues, visual schedules, tactile learning materials) to high-tech applications (e.g., tablets, text-to-speech software, speech-generating devices, and adaptive learning platforms)—designed to enhance functional capabilities and reduce barriers to learning (Dell et al., 2017; McNaughton & Light, 2013). Importantly, AT is not intended to replace human interaction or pedagogy; rather, it is most effective when integrated into everyday teaching practices and when it expands the ways learners can access content, express understanding, and participate in classroom routines (Alnahdi, 2014; Dell et al., 2017). In line with this view, the Down Syndrome Association of Greater St. Louis (DSAGSL, 2024) describes assistive technology as any item, equipment, or software system used to improve functional capabilities for individuals with disabilities. Conceptually, this definition highlights an inclusion-oriented purpose: technology is framed as a practical mechanism for

  

participation and autonomy, enabling learners to communicate needs, engage with instruction, and build independence across contexts (DSAGSL, 2024; World Health Organization [WHO], 2011).

International research increasingly links AT use not only to classroom performance but also to broader outcomes relevant to long-term inclusion. In communication, AAC tools and speech-generating devices have been associated with improved expressive language and reduced frustration, particularly for learners who are minimally verbal or who benefit from consistent auditory-visual feedback (McNaughton & Light, 2013). In academic learning, technology-supported materials can allow students to work at an individualized pace, receive immediate feedback, and access multimodal explanations that may be more compatible with DS learning profiles (Dell et al., 2017). Beyond these instructional benefits, AT is frequently discussed as a contributor to self-determination and participation—outcomes that matter for both educational equity and later quality of life (Bandura, 1997; WHO, 2011). From a psychological perspective, when learners can successfully initiate communication, make choices, and complete tasks with appropriate supports, they may develop stronger perceptions of competence and agency, which are central to self-efficacy (Bandura, 1997). While technology alone cannot produce such outcomes, it can create conditions in which students experience repeated success and increasingly active roles in their learning (Alnahdi, 2014; Dell et al., 2017).

A useful synthesis of this broader perspective is offered by Arriola et al. (2022), who report that assistive technologies can contribute to educational participation while also supporting life skills relevant to independent adulthood. Their review emphasizes that AT is most meaningful when understood within a wider inclusion "ecosystem": access to devices is necessary, but insufficient if the surrounding educational environment is not prepared to implement them effectively (Arriola et al., 2022). In practice, this means that technology integration depends on multiple interacting factors, including teacher knowledge and confidence, adaptation of pedagogy and assessment practices, family involvement, and the availability of culturally and linguistically appropriate tools (Alnahdi, 2014; Arriola et al., 2022). Framed in this way, AT becomes less about the presence of devices and more about the capacity of a system to use technology purposefully—aligning tools with learner needs, enabling participation across settings, and maintaining use over time through training, technical support, and sustainable resourcing (Arriola et al., 2022; WHO, 2011).

These issues are particularly relevant in contexts where inclusive education reforms are developing but not yet fully institutionalized. In Azerbaijan, inclusive education has expanded gradually since the early 2010s, with pilot initiatives and targeted efforts to improve access for learners with intellectual and developmental disabilities. Nevertheless, the systematic integration of assistive technologies remains limited. Commonly reported constraints in comparable contexts include uneven access to devices, insufficient professional training, limited technical support, and a lack of local-language digital resources—factors that can restrict both quality and consistency of implementation (Alnahdi, 2014; WHO, 2011). Where AT tools are available, their effectiveness often depends on whether teachers and families can integrate them into daily routines and whether schools have clear guidance on selection, use, and evaluation (Dell et al., 2017; Arriola et al., 2022). Therefore, examining AT implementation in Azerbaijan is not only a question of "what technologies exist," but also how educational stakeholders understand and apply them within real classrooms and home environments.

Against this background, the present study explores how assistive technologies are currently used to support students with Down syndrome in Azerbaijani educational settings and how key stakeholders—teachers and parents—perceive their impact on learning and communication. By linking stakeholder experiences to international evidence and inclusion frameworks such as Universal Design for Learning (UDL), the study aims to identify both enabling conditions and barriers that shape AT integration (Alnahdi, 2014). Clarifying these factors is important for policy and practice because it can inform training priorities, guide the development of localized resources, and support more equitable implementation across schools. Ultimately, understanding AT within the Azerbaijani context contributes to wider global discussions about digital inclusion and inclusive education, while also offering practical insights for strengthening participation, autonomy, and educational opportunity for learners with Down syndrome (WHO, 2011; UNICEF & WHO, 2023).

## LITERATURE REVIEW

The expanding body of international scholarship clearly indicates that assistive technologies (AT) play a significant and transformative role in supporting learners with intellectual disabilities, with particularly strong evidence emerging for students with Down syndrome (DS). Across diverse educational systems, AT is no longer conceptualized solely as an auxiliary support, but rather as a central mechanism for promoting educational equity, meaningful participation, and learner autonomy. In the United States, this approach is institutionally reinforced through the Individuals with Disabilities Education Act (IDEA), which mandates that assistive technology be systematically considered within every Individualized Education Program (IEP). This legal requirement has

  

shaped inclusive education practices beyond national borders, encouraging schools worldwide to adopt technology-based interventions that are responsive to the cognitive, communicative, and sensory characteristics associated with DS (McNaughton & Light, 2013; Dell et al., 2017).

A substantial body of empirical research demonstrates that AT contributes positively to self-determination, independent learning, and social participation among individuals with Down syndrome. McNaughton and Light (2013) report that augmentative and alternative communication (AAC) systems—including speech-generating devices (SGDs)—can substantially enhance expressive language abilities while reducing frustration linked to communication breakdowns. Complementing this perspective, Dell et al. (2017) argue that assistive technologies support learner autonomy by allowing students to engage with educational content at an individualized pace and through modalities that align with their sensory and cognitive strengths, thereby fostering sustained engagement and motivation.

Building on these empirical findings, professional organizations have sought to systematize the application of AT for learners with DS. The Down Syndrome Association of Greater St. Louis (DSAGSL, 2024) categorizes assistive technologies into four broad domains relevant to this population. These include communication tools (e.g., Proloquo2Go, TouchChat HD, and GoTalk NOW) designed to support expressive language and social interaction; literacy and numeracy tools such as text-to-speech software, audiobooks, and adaptive mathematics platforms that facilitate comprehension and cognitive engagement; executive function supports, including visual schedules, task organizers, and reminder systems that help structure routines and sustain attention; and environmental control systems, such as adaptive switches and smart classroom technologies that enhance mobility and physical accessibility. Together, these categories illustrate the multifaceted ways in which AT can address both academic and functional needs.

Further insight into the empowering potential of AT is provided by recent work from the Assistive Living Support Organization (ALSO, 2024), which conceptualizes technology as a means of "unlocking potential through personalized learning environments." This perspective emphasizes that AT supports the development of self-confidence and learner agency by enabling individuals to take ownership of their learning processes. Rather than functioning as a corrective or compensatory aid, AT is framed as a medium that acknowledges neurodiversity, allowing learners to demonstrate understanding through alternative pathways such as visual reasoning, auditory feedback, and interactive storytelling. Such an approach aligns with broader inclusive education principles that prioritize flexibility and learner-centered design.

At the international level, inclusive education models implemented in countries such as Finland, Italy, and Canada offer illustrative examples of how AT can be meaningfully embedded within established pedagogical frameworks, including Montessori and Reggio Emilia approaches. These models emphasize multisensory learning through tactile, auditory, and visual experiences, principles that closely correspond with the Universal Design for Learning (UDL) framework (Alnahdi, 2014). UDL advocates for multiple means of representation, engagement, and expression, positioning technology not merely as a device, but as an integral component of a flexible and responsive learning environment.

Empirical studies from these contexts further substantiate the benefits of such integration. Research conducted in Finland indicates that early and systematic incorporation of AT is associated with improvements in joint attention, memory recall, and peer communication among students with DS (O'Halloran et al., 2021). Similarly, studies from Italy report that the use of interactive whiteboards and adaptive storytelling applications within Reggio-inspired classrooms leads to measurable gains in language comprehension and socio-emotional development. Collectively, these findings highlight the value of combining human-centered pedagogy with thoughtfully implemented technological supports.

In contrast, the integration of assistive technologies within the Azerbaijani education system remains at an early stage of development. Since 2018, the Ministry of Education has introduced a number of pilot inclusive schools aimed at adapting learning environments for students with intellectual and developmental disabilities. Nevertheless, significant challenges persist. These include limited access to specialized digital tools, a shortage of educators trained in AT integration, and the absence of Azerbaijani-language assistive software. In addition, collaboration between educational institutions and technology developers remains underdeveloped, limiting the production of culturally and linguistically relevant resources.

Despite these constraints, increasing awareness of inclusive education and digital equity in Azerbaijan presents a valuable opportunity to draw on international experience. By critically engaging with global research findings and

  

established models of AT integration, Azerbaijan's inclusive education framework can progress toward a more systematic and sustainable adoption of assistive technologies. Such an approach has the potential not only to enhance access to education, but also to ensure that students with Down syndrome are actively empowered to participate, learn, and succeed within both academic and social domains.

## METHODOLOGY

This study employed a qualitative descriptive research design to explore how assistive technologies (AT) influence learning, communication, and classroom engagement among students with Down syndrome (DS) in Azerbaijan. A qualitative approach was deemed most appropriate, as it allows for an in-depth and context-sensitive examination of teachers' and parents' lived experiences, perceptions, and everyday practices related to the integration of technology within inclusive education settings. Rather than aiming to test hypotheses or quantify outcomes, the study sought to describe and interpret how assistive technologies are used, understood, and experienced in real educational environments supporting children with DS.

The research was guided by an interpretive perspective that recognizes educational practices as socially and contextually situated. In line with this approach, particular attention was paid to how meanings around AT use are constructed by key stakeholders—teachers and parents—within their institutional, cultural, and resource-related contexts. The researcher's professional background in inclusive education informed sensitivity to classroom dynamics and participant perspectives; to mitigate potential bias, reflexivity was maintained throughout the research process through ongoing analytic reflection and careful grounding of interpretations in the data.

The study focused on inclusive and special education settings located in Baku, reflecting the current concentration of pilot inclusion initiatives and access to assistive technologies within Azerbaijan. This geographic scope represents a limitation, as the findings cannot be generalized to rural regions or to all educational contexts nationally. However, by concentrating on schools with emerging experience in AT use, the study provides an in-depth insight into early-stage implementation processes, challenges, and perceived impacts. Such contextualized understanding is valuable for informing future policy development, teacher training, and the scalable integration of assistive technologies within Azerbaijan's inclusive education system.

### Participants And Setting

The study involved a total of 25 participants, comprising 15 teachers and 10 parents, recruited from three inclusive schools and two special education schools located in Baku, Azerbaijan. Teachers represented a range of professional backgrounds, including special education, speech and language therapy, and general primary education, with teaching experience ranging from 3 to 18 years. This diversity allowed for the inclusion of perspectives informed by varying levels of pedagogical training and professional practice in relation to students with Down syndrome (DS).

Parents were selected using purposive sampling to ensure representation of children with differing cognitive and communicative profiles, primarily within the mild to moderate range of intellectual disability. This sampling strategy was intended to capture variability in assistive technology (AT) use and perceived impact across home environments, while maintaining relevance to inclusive and special education contexts. The inclusion of both teachers and parents enabled a more comprehensive understanding of AT implementation, encompassing formal classroom practices as well as informal, home-based use.

All participating schools had previously been involved in small-scale inclusive education pilot initiatives launched by the Ministry of Education of the Republic of Azerbaijan. These schools were selected because they had limited yet established exposure to digital and assistive learning tools, such as interactive whiteboards, tablets, and visual communication supports. Focusing on schools with emerging experience in AT integration allowed the study to examine early-stage implementation processes, including both enabling conditions and practical constraints.

The concentration on schools within Baku reflects the current distribution of inclusive education pilots and access to technological resources in Azerbaijan. While this urban focus limits the generalizability of findings to rural or less-resourced regions, it provides a detailed and contextually grounded account of how assistive technologies are being introduced and utilized within the country's developing inclusive education framework.

  

**Data Collection Tools And Procedures**

Data collection was conducted over a three-month period between March and May 2024. To enhance the credibility and trustworthiness of the findings, three complementary qualitative methods were employed, allowing for methodological triangulation across data sources and participant groups.

First, semi-structured interviews were carried out with all participating teachers and parents. The interview format provided sufficient structure to ensure consistency across participants, while also allowing flexibility to explore individual experiences in depth. Teachers were asked to reflect on their use of assistive technologies (AT) within classroom settings, including strategies for integration, student responses, and perceived effects on learning and communication. Parents were invited to discuss AT use in home environments, with particular attention to changes in communication, motivation, and daily functioning observed in their children.

Second, focus group discussions were organized to facilitate collective reflection and interaction among participants. Two focus group sessions were conducted with teachers and one with parents. This method enabled participants to share experiences, compare practices, and collaboratively identify challenges, successful strategies, and professional development needs related to AT implementation. The group format encouraged dialogue and the emergence of shared perspectives that may not have been captured through individual interviews alone.

Third, systematic classroom observations were undertaken on a weekly basis to document the naturalistic use of assistive technologies during instructional activities. Observations were guided by a structured observation protocol designed to capture (a) the frequency of AT use, (b) the type of device or application employed, and (c) patterns of student participation and engagement. This approach allowed the researcher to examine how AT was enacted in practice and how teachers facilitated its use within everyday classroom routines.

Across observed sessions, the most frequently utilized technologies included tablet-based applications such as *Speech Blubs* and *Bitsboard*, interactive whiteboards used to support visual learning, and low-technology aids such as pictorial cue cards and tactile alphabet materials. The inclusion of both digital and low-tech supports reflects the adaptive strategies employed by educators in response to resource availability and student need

**Data Analysis**

The qualitative data generated through interviews, focus group discussions, and classroom observations were analyzed using thematic analysis, following the six-phase framework outlined by Braun and Clarke (2006). This analytic approach was selected because it allows for the systematic identification, interpretation, and reporting of patterns of meaning across diverse qualitative data sources, while remaining flexible enough to capture context-specific experiences.

The analysis began with a familiarization phase, during which all interview and focus group transcripts, as well as observation field notes, were read and re-read to gain an overall understanding of the dataset. Initial codes were then generated inductively, focusing on recurrent ideas, practices, and perceptions related to the use of assistive technologies (AT). Coding was conducted across the entire dataset to ensure that both convergent and divergent perspectives were captured.

Subsequently, codes with conceptual similarity were collated into broader categories, which were iteratively reviewed and refined to develop candidate themes. During this stage, attention was paid to the internal coherence of each theme and to distinctions between themes, ensuring that each captured a meaningful and analytically distinct aspect of participants' experiences. Themes were further refined by examining their relevance to the research questions and their prevalence across data sources.

The final phase involved defining and naming the themes and constructing an analytic narrative that linked empirical findings to the study's aims and research questions. Through this process, three overarching themes were identified: **(1) Access and Usage of Assistive Technology**, encompassing device availability, frequency of use, and teacher confidence; **(2) Perceived Effectiveness**, reflecting observed changes in communication, attention, and motivation; and **(3) Barriers to Implementation**, including limitations related to technical infrastructure, professional training, and financial resources.

  

To enhance the trustworthiness of the analysis, data triangulation was employed by systematically comparing insights derived from interviews, classroom observations, and focus group discussions. Reflexivity was maintained throughout the analytic process with a researcher diary, which documented analytic decisions, emerging interpretations, and reflections on the researcher's positionality. This reflexive practice supported transparency and helped ensure that interpretations were grounded in the data rather than in pre-existing assumptions.

**Trustworthiness And Rigour**

To ensure methodological rigour and trustworthiness, the study adhered to established criteria for qualitative research quality, including credibility, dependability, confirmability, and transferability. These criteria guided data collection, analysis, and interpretation throughout the research process.

**Credibility** was strengthened through methodological triangulation by integrating data from multiple sources, including semi-structured interviews, focus group discussions, and classroom observations. Comparing perspectives across teachers and parents, as well as across data collection methods, enabled the identification of consistent patterns while also capturing divergent experiences. Prolonged engagement in the field over a three-month period further enhanced the depth and authenticity of the findings.

**Dependability** was supported by maintaining a transparent and systematic analytic process. The use of a clearly defined thematic analysis framework, following the six-phase approach outlined by **Using thematic analysis in psychology**, ensured consistency in coding and theme development. Detailed documentation of analytic steps and decisions allows the research process to be traceable and, in principle, replicable.

**Confirmability** was addressed through reflexive practice. The researcher maintained a reflexive diary throughout data analysis, recording analytic decisions, emerging interpretations, and reflections on positionality. This practice helped minimize the influence of personal assumptions and ensured that interpretations were grounded in participants' accounts rather than researcher expectations.

**Transferability** was supported by providing rich, contextualized descriptions of participants, settings, and educational practices. While the study is limited to inclusive and special schools in Baku and does not aim for statistical generalization, the detailed contextual information enables readers to assess the relevance of the findings to similar educational contexts, particularly in settings with developing inclusive education systems.

**Ethical Considerations**

Ethical approval for this study was obtained from the Research Ethics Committee of the Azerbaijan State Pedagogical University prior to the commencement of data collection. All participants were fully informed about the aims and procedures of the study and provided written informed consent before participation. Participants were assured that their involvement was voluntary and that they could withdraw from the study at any stage without any negative consequences.

Confidentiality was maintained through the anonymization of all data, with participants identified using coded labels in transcripts and field notes. During classroom observations, particular care was taken to minimize disruption to teaching activities and to respect the dignity, privacy, and wellbeing of students with disabilities. No identifying information related to students was recorded.

Overall, the ethical procedures adopted in this study ensured that the research was conducted in a respectful, responsible, and ethically sound manner, providing a secure foundation for exploring how assistive technologies are applied in inclusive and special education settings in Azerbaijan and how stakeholders perceive their impact on learning and communication outcomes.

*Ethical approval was granted by the Research Ethics Committee of the Azerbaijan State Pedagogical University, and all procedures were conducted in accordance with established ethical standards for qualitative research involving human participants.*

  

## RESULTS

The findings of this qualitative descriptive study are organized around three overarching themes that emerged from the thematic analysis: (1) access and usage of assistive technology (AT), (2) perceived effectiveness in learning and communication, and (3) barriers to implementation. Each theme integrates evidence drawn from teacher interviews, parental accounts, and systematic classroom observations conducted across five inclusive and special education schools in Baku.

### Access And Usage Of Assistive Technology

Overall, both teachers and parents expressed positive attitudes toward the use of assistive technology in supporting students with Down syndrome. Nevertheless, the extent, consistency, and depth of AT use varied substantially across settings, largely influenced by resource availability and teachers' familiarity with specific tools.

Teachers identified tablet-based applications—most notably Speech Blubs, Bitsboard, and Proloquo2Go—as the most accessible and frequently used technologies. These tools were primarily employed to support vocabulary acquisition, sentence construction, and pronunciation practice. In addition, visual supports such as interactive whiteboards, pictorial cue cards, and tactile alphabet materials were commonly integrated into group activities to sustain attention and participation.

As one teacher (T3) explained:

"When we use picture-based apps or sound boards, the children are more focused. They point, repeat, and smile when they hear their own voice played back. It keeps them involved much longer than paper worksheets."

Parental perspectives reinforced these observations. Parents who incorporated similar tools at home reported increased interest in learning-related activities and more spontaneous communication during daily routines. Several parents described how speech-generating applications enabled their children to express needs more clearly, leading to reduced frustration and emotional distress.

Despite these positive experiences, access to modern AT devices was reported to be uneven. Participants noted that such resources were often limited to schools supported by donor-funded inclusion initiatives. Many teachers reported sharing a single tablet among several students, and in some cases devices were outdated or lacked Azerbaijani-language functionality, restricting consistent use.

### Perceived Effectiveness In Learning And Communication

Teachers consistently reported observable improvements in students' attention, task persistence, and communication attempts when AT was integrated into lessons. Classroom observations suggested that approximately 70% of students demonstrated longer engagement during activities that incorporated visual and auditory technologies compared to sessions delivered without technological support.

Speech-generating devices (SGDs) were described as particularly beneficial for non-verbal or minimally verbal students. Teachers emphasized that the immediate auditory feedback provided by these tools reinforced language learning and encouraged repeated communication attempts. The "press-and-hear" function of SGDs was reported to support phonological awareness and recall of target vocabulary.

In addition, visual scheduling applications and digital timers were widely perceived as effective tools for supporting transitions between activities. One teacher (T8) reflected:

"When I use a visual timer or schedule on the smartboard, transitions are smoother. The students know what's next, and they feel less anxious."

  

Parents similarly reported behavioral and emotional improvements, describing their children as more confident and less reliant on continuous adult prompting. Several parents highlighted emerging independence, reflected in expressions such as “I can do it myself,” which they associated with consistent engagement with AT.

Collaborative use of AT also appeared to foster peer interaction. Group activities involving touchscreens and sound-matching games encouraged turn-taking and cooperative engagement—skills that are often challenging for students with Down syndrome. These qualitative observations align with international research suggesting that AT can support both academic learning and socio-emotional development.

**Barriers To Implementation**

Despite the reported benefits, participants identified multiple systemic barriers that limited the full potential of AT integration in both inclusive and special education settings.

Limited teacher training.

Most teachers reported having received no formal training in assistive technology. Knowledge was primarily acquired through self-directed exploration or informal peer exchange. As one participant (T5) noted:

“We try to learn by exploring the apps ourselves. There is no structured guidance or training from the Ministry, so we experiment and see what works.”

Insufficient funding and outdated equipment.

Financial constraints were frequently cited as a major barrier. Schools often lacked sufficient devices, and some teachers reported using personal tablets for classroom demonstrations. This resulted in uneven access, with better-resourced urban schools having greater opportunities for AT use.

Lack of localized content.

Nearly all teachers highlighted the absence of Azerbaijani-language AT applications as a significant challenge. Most available tools were in English or Turkish, requiring teachers to translate instructions manually or simplify content, thereby reducing efficiency and accessibility.

Inconsistent policy and institutional support.

Participants observed that, although inclusive education reforms have begun, there are no clear national standards governing the selection, implementation, or evaluation of assistive technologies. In the absence of centralized guidance and technical support, schools relied largely on informal and fragmented initiatives.

Despite these constraints, both teachers and parents expressed cautious optimism. They emphasized that even limited exposure to AT had already contributed to improved engagement and independence among students, suggesting substantial untapped potential.

**Summary Of Findings**

Taken together, the findings indicate that assistive technologies function as powerful mediators of learning and participation for students with Down syndrome. When appropriately implemented, AT supports active engagement, enhances communication, and fosters confidence and autonomy. However, these benefits are unevenly distributed due to systemic, infrastructural, and linguistic barriers.

Aligning assistive technology adoption with structured teacher training, localized content development, and coherent inclusive education policy emerges as a critical step for moving from isolated initiatives toward sustainable, technology-supported inclusion within Azerbaijan’s education system.

  

## DISCUSSION

The findings of this study demonstrate that assistive technologies (AT) can substantially enhance the educational experiences of students with Down syndrome (DS) by supporting communication, attention, and autonomy. These outcomes are broadly consistent with international research indicating that technology can act as a bridge between learner potential and educational participation (McNaughton & Light, 2013; Dell et al., 2017; Assistive Living Support Organization [ALSO], 2024). At the same time, the Azerbaijani context reveals a combination of encouraging practices and persistent structural constraints, highlighting the importance of situating AT implementation within its specific institutional and policy environment.

### Interpreting Findings In The Context Of Inclusive Education

The positive effects observed in this study—such as increased task persistence, improved expressive communication, and reduced behavioral anxiety—suggest that AT supports functional inclusion rather than mere physical placement in mainstream classrooms. Teachers' accounts illustrated how students with DS became more engaged and communicative when using tools such as *Speech Blubs* and *Proloquo2Go*. Through multisensory input and immediate feedback, these tools appeared to shift students from passive recipients of instruction to more active participants in learning activities.

These findings align closely with the principles of the Universal Design for Learning (UDL) framework, which advocates for multiple means of engagement, representation, and expression within learning environments (Alnahdi, 2014). Assistive technologies operationalize these principles by enabling students to access and process information through visual and auditory channels, rather than relying solely on verbal or text-based instruction. Given that learners with DS often experience challenges in auditory processing alongside relative strengths in visual recognition, such multimodal approaches are particularly well suited to their learning profiles.

In addition, the reported benefits of visual schedules, timers, and interactive boards point to the role of AT in supporting executive functioning. Structured visual cues helped students anticipate transitions and regulate behavior, contributing to reduced anxiety and smoother classroom routines. This observation is consistent with findings by O'Halloran et al. (2021), who emphasize the importance of predictable, visually guided learning environments for students with developmental disabilities.

### The Role Of Assistive Technology In Empowerment And Independence

Beyond academic engagement, the study highlights the role of AT in fostering emotional resilience, self-determination, and emerging independence among learners with DS. Parents described how communication applications enabled their children to express needs, preferences, and choices more independently, contributing to a growing sense of agency. This aligns with the social model of disability, which conceptualizes technology as a means of reducing environmental barriers rather than compensating for individual deficits.

Consistent with guidance from the Down Syndrome Association of Greater St. Louis (DSAGSL, 2024), assistive technologies in this study appeared to transform patterns of dependency into opportunities for participation. Behavioral changes reported by parents—such as increased confidence and reduced frustration—suggest that AT may support the development of self-efficacy, a psychological construct strongly associated with long-term learning and adaptation (Bandura, 1997). These findings are also in line with Arriola et al. (2022), who report that sustained AT use can enhance independent life skills, decision-making, and social inclusion for individuals with Down syndrome. In this sense, AT extends beyond instructional efficiency to support dignity, identity, and belonging.

### Barriers And Systemic Gaps

Despite these benefits, the study identifies several systemic barriers that constrain the full realization of AT's potential in Azerbaijan. The most prominent challenges include limited teacher training, restricted access to modern devices, and the absence of Azerbaijani-language digital materials. These findings mirror international evidence suggesting that the success of assistive technology depends as much on educator competence and institutional support as on the availability of tools themselves (Alnahdi, 2014).

  

Teachers expressed strong motivation to integrate AT into their practice but also frustration at the lack of structured training and clear policy guidance. As a result, implementation often relied on self-directed learning and informal peer support, leading to variability in quality and consistency. Without a national framework defining standards for AT selection, funding, and evaluation, schools tended to operate in isolation rather than within a coordinated system.

Language and cultural barriers further compounded these challenges. Most available AT platforms were designed for English-speaking contexts, requiring Azerbaijani educators to adapt content manually. As also emphasized by ALSO (2024), the localization of assistive technologies is essential for ensuring accessibility, relevance, and sustained use in diverse educational contexts.

**Toward Sustainable Implementation**

For assistive technology to move from sporadic use toward systemic inclusion, a coordinated, multi-level approach is required. Teacher education programs should incorporate AT-focused modules addressing practical classroom integration, ethical considerations, and individualized instruction. At the institutional level, partnerships between universities, technology developers, and the Ministry of Education could facilitate the development and localization of digital tools aligned with national curricula. In parallel, sustainable funding mechanisms are necessary to ensure equitable access to devices and digital infrastructure across schools.

The findings also suggest that collaboration between families and educators amplifies the impact of AT. When parents are supported to use assistive tools at home, continuity between school and home environments is strengthened, reinforcing communication and learning across contexts. Ultimately, AT should be understood not as an optional supplement but as a core component of inclusive education policy. International evidence indicates that when embedded within curricula and supported by professional training, assistive technologies can enable levels of engagement and independence previously considered unattainable for students with DS (McNaughton & Light, 2013; ALSO, 2024).

**Summary of Discussion**

Overall, the discussion underscores that assistive technology functions as a catalyst for inclusive transformation, enabling students with Down syndrome to learn, communicate, and participate in ways that align with their strengths. In Azerbaijan, early inclusive education initiatives demonstrate considerable promise but require strategic expansion. To fully realize the potential of AT, stakeholders must prioritize capacity building, policy coherence, and the development of culturally and linguistically adapted resources. By embracing AT as both a pedagogical and social instrument, the Azerbaijani education system can move closer to the principle of education for all—one that recognizes and values neurodiversity while empowering every learner.

## RECOMMENDATIONS

Based on the findings and discussion presented above, a set of recommendations is proposed to support the effective and equitable integration of assistive technologies (AT) for students with Down syndrome (DS) within Azerbaijan's inclusive education system. These recommendations address interrelated dimensions of educational policy, pedagogical practice, professional capacity building, technological infrastructure, and family engagement, with the aim of moving from isolated initiatives toward a sustainable and system-wide approach to inclusive, technology-supported education.

**Policy And Strategic Framework**

**National Assistive Technology Strategy.** The Ministry of Education should develop a comprehensive National Strategy on Assistive Technologies in Education to establish clear standards for device selection, usage protocols, and evaluation indicators. Such a framework would promote consistency across regions and reduce inequalities in access between urban and rural schools.

**Integration into Inclusive Education Policy.** Assistive technologies should be explicitly embedded within Azerbaijan's inclusive education reforms and national curriculum standards. This integration would ensure that AT is recognized as an essential educational resource rather than an optional or supplementary support.

  

**Sustainable Funding Mechanisms.** A long-term funding model should be established through a combination of public investment, public–private partnerships, grant schemes, and collaboration with non-governmental organizations. Sustainable financing is critical for acquiring modern AT devices, maintaining equipment, and supporting ongoing implementation.

### 6.2 TEACHER PROFESSIONAL DEVELOPMENT

**Specialized AT Training.** Pre-service and in-service teacher education programs should include compulsory modules on the pedagogical use of assistive technologies, digital literacy, and Universal Design for Learning (UDL). These modules should emphasize practical classroom application alongside ethical and inclusive teaching principles.

**Continuous Professional Support.** The establishment of regional Assistive Technology Resource Centers would provide ongoing professional development, technical assistance, and coaching for teachers, therapists, and school staff. Such centers could serve as hubs for expertise and innovation.

**Collaborative Learning Networks.** Peer-mentorship and school-to-school collaboration should be encouraged, enabling institutions with experience in AT integration to support those at earlier stages of adoption. These networks would foster a sustainable community of practice within the education sector.

### 6.3 LOCALIZATION AND RESEARCH

**Cultural and Linguistic Adaptation.** Partnerships between universities, technology developers, and educational authorities should prioritize the development of Azerbaijani-language assistive technology software. This includes communication applications, literacy and numeracy tools, and adaptive learning platforms aligned with national curricula and cultural contexts.

**Evidence-Based Monitoring.** Longitudinal research should be conducted to evaluate the cognitive, linguistic, and socio-emotional outcomes associated with AT use among students with Down syndrome. Findings from such studies should directly inform policy decisions, resource allocation, and future program development.

**Research–Practice Partnerships.** Collaboration between Azerbaijan State Pedagogical University, inclusive schools, and private technology developers should be strengthened to co-design and test locally relevant digital learning ecosystems that bridge research and classroom practice.

### 6.4 FAMILY AND COMMUNITY INVOLVEMENT

**Parent Education Programs.** Structured training workshops should be developed to support families in using assistive technologies at home. Strengthening parental competence promotes continuity between school and home environments and reinforces children's communication and learning.

**Awareness and Advocacy Campaigns.** Public awareness initiatives are needed to reduce stigma surrounding disability and to promote understanding that assistive technologies enhance—rather than replace—human interaction, learning, and social inclusion.

**Community-Based Pilot Projects.** Local pilot initiatives, implemented in collaboration with municipalities and community organizations, can test innovative AT approaches and provide scalable models for national implementation.

### 6.5 INFRASTRUCTURE AND ACCESSIBILITY

**Digital Inclusion Investments.** Targeted investment is required to improve internet connectivity and digital infrastructure across schools, particularly in rural and under-resourced regions, to ensure equitable access to assistive technologies.

  

**Maintenance and Technical Support.** Regular maintenance, software updates, and technical support should be institutionalized, as outdated or malfunctioning equipment can undermine teacher confidence and student engagement.

**Universal Access Design.** All digital and physical learning environments should comply with accessibility standards to ensure usability for students with diverse abilities and learning needs.

**Concluding Note on Implementation**

Implementing these recommendations requires coordinated, intersectoral collaboration among educators, policymakers, healthcare professionals, non-governmental organizations, and technology developers. Only through a coherent, inclusive, and data-driven approach can Azerbaijan establish a sustainable assistive technology ecosystem that enables learners with Down syndrome to participate fully and thrive within inclusive education settings.

## CONCLUSION

This study adds to the growing body of evidence demonstrating that assistive technologies are not merely instructional tools but key enablers of empowerment, inclusion, and human development. For students with Down syndrome, assistive technology helps bridge the gap between individual learning profiles and the expectations of formal education by supporting communication, autonomy, and meaningful social participation.

The findings indicate that even within resource-constrained contexts such as Azerbaijan, the purposeful integration of assistive technologies—when supported by committed educators and active family involvement—can lead to notable improvements in learning engagement and emotional well-being. At the same time, the study highlights that isolated or project-based initiatives are insufficient for long-term impact. Systematic, national-level approaches are required to ensure sustainability and equity.

From a theoretical standpoint, the results reinforce the relevance of the Universal Design for Learning (UDL) framework and the social model of disability, both of which emphasize adapting educational environments to learner diversity rather than expecting learners to conform to rigid instructional norms. Within this perspective, assistive technology functions as a catalyst for transforming inclusion from a policy aspiration into a lived educational practice.

At a practical level, the study underscores that effective inclusion depends on more than teacher motivation alone. It requires coherent policy direction, professional training, culturally and linguistically appropriate resources, and reliable technological infrastructure. Without these structural supports, the potential of assistive technology cannot be fully realized.

Looking forward, Azerbaijan's education system is positioned at a critical juncture. By prioritizing digital inclusion and investing in assistive technologies as an integral component of inclusive education reform, the country can align more closely with international commitments to equity, accessibility, and neurodiversity. The insights generated by this study offer a foundational framework for scaling up assistive technology initiatives and strengthening cross-sector collaboration among education, technology, and health services.

Ultimately, integrating assistive technologies for learners with Down syndrome is not simply a matter of introducing devices. It involves creating sustainable pathways to participation, confidence, and independence—ensuring that every learner could learn, communicate, and fully thrive of their abilities.

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## Appendix A

### Semi-Structured Interview Guide for Teachers

The following semi-structured interview guide was used to explore teachers' experiences, perceptions, and practices related to the use of assistive technologies (AT) in inclusive and special education settings for students with Down syndrome.

1. Can you describe your professional role and teaching experience with students who have Down syndrome?
2. What types of assistive technologies are currently available in your classroom or school?
3. How do you typically integrate assistive technologies into daily teaching activities?
4. Which assistive technology tools do you find most effective for supporting communication and learning, and why?
5. Have you observed any changes in students' attention, motivation, or participation since introducing AT?
6. How do students respond emotionally and behaviorally to the use of assistive technologies?
7. What challenges do you face when using assistive technologies in the classroom?
8. Have you received any formal training in assistive technology use? If yes, please describe it.
9. What kind of support or resources would help you use assistive technologies more effectively?
10. In your opinion, how could assistive technologies be better integrated into Azerbaijan's inclusive education system?

## Appendix B

### Semi-Structured Interview Guide for Parents

This interview guide was designed to capture parents' perspectives on the use of assistive technologies at home and their perceived impact on their children's communication, learning, and independence.

1. Can you describe your child's learning and communication needs?
2. Does your child use any assistive technologies at home? If yes, which ones?
3. How did you first learn about assistive technologies for your child?
4. Have you noticed any changes in your child's communication skills since using AT?
5. How does your child respond emotionally to assistive technology use?
6. Do assistive technologies help your child become more independent in daily activities? Please provide examples.
7. What difficulties do you experience when using assistive technologies at home?
8. Have you received guidance or training from teachers or professionals on using AT?
9. How well do school-based and home-based uses of assistive technologies align?
10. What kind of support would you like to receive to improve your child's use of assistive technologies?

  

## Appendix C

### Classroom Observation Protocol

Classroom observations were conducted to document naturalistic use of assistive technologies and student engagement during instructional activities. Observations followed a structured protocol focusing on the following dimensions:

**1. Contextual Information**
- Type of school (inclusive or special)
- Class size
- Lesson subject
- Duration of observation

**2. Assistive Technology Usage**
- Type of AT used (e.g., tablet applications, interactive whiteboards, low-tech visual aids)
- Frequency of AT use during the lesson
- Individual or group-based use

**3. Teacher Facilitation**
- Instructional strategies used with AT
- Level of teacher guidance and scaffolding
- Adaptation of tasks for individual student needs

**4. Student Engagement**
- Attention and focus during AT-supported activities
- Communication attempts (verbal or non-verbal)
- Peer interaction and turn-taking
- Emotional responses (e.g., enthusiasm, frustration, confidence)

**5. Transitions and Classroom Management**
- Use of visual schedules or timers
- Student responses during transitions
- Behavioral regulation

Field notes were recorded immediately after each observation to capture contextual details and emerging patterns.

## Appendix D

### Summary of Coding Framework

Qualitative data were analyzed using thematic analysis. The following coding framework illustrates the main categories and examples of initial codes used in the analysis.

| Theme | Description | Sample Codes |
|---|---|---|
| Access and Usage of AT | Availability and patterns of technology use | Limited devices, shared tablets, visual supports |
| Perceived Effectiveness | Observed learning and communication outcomes | Increased attention, improved speech, motivation |
| Barriers to Implementation | Structural and practical challenges | Lack of training, funding constraints, language barriers |

This framework guided the development of themes presented in the Results section.

  

# IMPACTS OF WAR ON CHILDREN AND ADOLESCENTS

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**ABSTRACT**
Many children have lost their lives in wars in recent years. Those who survived witnessed extraordinary violence. Many children lost their parents and relatives, and almost all their homes and buildings were destroyed. Children and their families are denied safe access to food, water, electricity, medicine, and hospitals. Hospitals and schools were bombed. Especially children and adolescents are psychologically affected by all these negativities. The degree of impact varies depending on the degree of violence experienced in the war, the age of the children, their upbringing, their financial situation, and whether similar vulnerabilities have been experienced before. Another important issue is that the problems of children and adolescents do not end with the end of the war and emerge as post-traumatic syndrome later in life. One of the impacts of war on children and adolescents is that the violence applied by the authorities becomes legitimized for children. For these reasons, the necessary treatment and psycho-social support should be provided to children and adolescents, as well as to those responsible for the care of children and teachers.

**Keywords**: Adolescent, child, psychosocial support, war, war victim.

## INTRODUCTION

War is a serious public health issue. Particularly in modern times, wars are closely followed by countries worldwide through the media and social platforms, and their devastating consequences negatively affect everyone. However, children form the most impacted group. The 2022 UNICEF report highlights that children who survive war experience severe trauma (UNICEF, 2022). While 90% of those who died in World War I were soldiers, recent wars have seen the majority of casualties being civilians, including women and children, underscoring the urgent need for international measures. According to a United Nations report from 2018, the number of children killed or injured in wars and conflicts in 2018 reached 12,000 (the highest number since 2005). In 2021, 2,515 children were killed, in 2022, 2,985, and in 2023, by December 14, a total of 19,453 people, including 8,000 children in Gaza, had lost their lives. The Geneva Conventions, signed on August 12, 1949, with the aim of regulating the rules of war and protecting war victims, is one of the most significant legal documents related to human rights (https://tr.euronews.com/2019/08/12/cenevre-sozlesmeleri). The fourth of these conventions, known as the Geneva Conventions, specifically addresses the protection of civilians during war. Despite this, in recent wars, many civilian children and adults have been killed, and their homes and service buildings have been almost entirely destroyed. Children and their families' access to food, water, electricity, medicine, and hospitals has been obstructed, and hospitals and schools have been bombed. The situation in the Gaza-Israel war, where 10 children are reportedly killed every minute, is even more dire. Historians express sadness and astonishment in the media, noting that such cruelty was not witnessed even in the distant past when warfare technology was less advanced. Sadi Bereke, a 63-year-old cemetery worker in Gaza, told an Anadolu Agency (AA) reporter that they buried 600 women and children in a single day, exceeding the total number of burials in Gaza over the past five years (https://www.trthaber.com/haber/dunya/gazzedeki-mezarlik-gorevlisi-). Children and adults in war zones experience violence the most. In other words, war is one of the greatest disasters that can befall humanity. Beyond the physical harm of death and injury, children may witness armed attacks, explosions, the deaths of their loved ones, deprivation of basic needs and exposure to extreme cold or heat can have an even more traumatic impact. Children who survive face the difficult reality of being orphaned, displaced from their homes and countries, and subjected to complex issues that are difficult to resolve. Many children also experience psychological, physical, economic, and sexual abuse during and after war, with some describing these conditions as more painful than death itself. Children are the most vulnerable group in war environments, where injured individuals cannot be helped and proper care for existing diseases is unattainable. Furthermore, babies born in unhealthy environments due to the lack of necessary healthcare increase the risk of infant mortality.

  

**The Physical and Psychological Effects of War on Children and Adolescents**

The victimization of children and adolescents in war can be evaluated in two ways. **In primary victimization**, children directly experience the adverse effects of war. They suffer significant physical harm through injury, death, the loss of family members, and lack of access to shelter, food, care, and medical treatment. **In secondary victimization,** while not directly exposed to these negative events, they witness the overall adverse consequences of war. Fear and a lack of safety are prominent feelings. Children and adolescents are psychologically affected by the physical consequences of war, and the degree of this impact varies based on the level of violence, the children's age, upbringing, socioeconomic status, and whether they have faced similar vulnerabilities before.

**Post-Traumatic Stress Disorder**

A key issue is that the negative effects of war on children and adolescents do not cease when the war ends. The traumatic nature of modern warfare leaves lasting psychological scars on children and adolescents. Many of these effects are called as Post-Traumatic Stress Disorder (PTSD), continuing for long periods. The World Health Organization (WHO) defines trauma as the intense stress individuals experience in response to threatening events. Post-Traumatic Stress Disorder (PTSD) is a psychological disorder that threatens the physical and mental health of the individual, creates a sense of terror, fear, insecurity, anxiety and helplessness, causes inadequacy in coping and whose effects continue for a long time. Besides, this condition can also lead to problems in social and professional life. Anxiety, nervousness, sleep disturbances, nightmares, and changes in appetite are common in children who experience war-related PTSD. More importantly, persistent fears, worries, and insecurity about the future emerge, often associated with guilt guilt that the events will happen again, that the person will be left alone and defenseless, and that they will be punished for their wrongdoings (American Psychiatric Association, 2000).

**Studies on the Effects of War on Children**

Even when children affected by war are provided with shelter, education, and financial support, the impact of their traumatic experiences can last for a long time. In a study conducted on 232 children affected by war, most were found to suffer from PTSD as well as behavioural disorders, anxiety, stress disorders, and attention deficits. Another study involving 4,365 children affected by war, conflict, and terrorism reported similar findings, with children developing stress reactions such as PTSD, behavioral and emotional problems, depressive symptoms, anxiety disorders, and phobias (Betancourt et al., 2009; Cohen & Eid, 2007; Comer & Kendall, 2007). Furthermore, another study found that children experienced sleep and psychosomatic problems after war. Similar issues were observed in the results of a study conducted by Khamis (2016) on 205 families and their children who had been directly affected by war. Another study reported that 98% of children with worsening psychological conditions after war exhibited symptoms such as crying, screaming, disrupted sleep patterns, unhappiness, and bedwetting. Despite a partial reduction in post-traumatic stress symptoms after the war, most studies on this subject indicate that childhood traumas have a lasting impact on cognitive, moral, and personality development, as well as interpersonal relationships and coping abilities (Barath, 2002; Dubow, Huesmann & Boxer, 2009). Children who are displaced from their homes, schools, and friends, and who lose all their belongings, including toys and personal items, often experience deep sadness, pain, and anger, feeling powerless and insecure. These children may face difficulties in social and marital relationships and could develop substance or alcohol dependence

**Children and Adolescents Aged 0-6 Affected by War**

Children aged 0-6 need parental care. The disruption of an environment of love and security can cause children to face serious problems both after the war and in the future. Adolescents affected by war may struggle to make plans for the future. Their concerns about the future can negatively affect their expectations, academic success, and zest for life. Problems in relationships with family, school, and the environment can negatively impact their adjustment to their surroundings. As a coping mechanism for the traumatic events they have experienced, adolescents may engage in risky behaviors that harm themselves and others. Their tendencies toward violent, aggressive behavior may increase. They may also experience intensified feelings of insecurity and disruptions in their sense of self.

**The Social Effects of War on Children**

The physical, psychological, and social effects of war are closely related. Having to live with and defend oneself for a long time against violence, especially in wartime environments, can establish the belief that violence must be met with violence. It may even legitimize violence. Research shows that in countries where war has persisted for a long time, homicide rates have increased by between 10% and 79% (Archer & Gartner, 1976). War can also negatively impact the moral development of children. In the moral collapse created by war, children may struggle

  

to distinguish between right and wrong. They may begin to believe that the violent actions displayed by authority figures are morally acceptable. The feelings of revenge and hostility experienced by children who have lost loved ones and homes in the war and have been forced to migrate may trigger the development of a culture of violence. This undermines the cultural norms of peace, security, solidarity, and charity. Consequently, children may experience difficulties in friendship, marriage, and other social relationships. Children who witness the violent behaviors of role models may learn to resort to aggression to protect themselves (Gökler, 2001). Moreover, the angry adults around them may reinforce these aggressive behaviors. Children raised in today's war-torn environments may have the potential to become active perpetrators of violence in the future.

**Measures to Be Taken for Children and Adolescents Affected by War**

The physical, psychological, and social support that can be provided to children affected by war varies depending on the degree of victimization and the ages of the children. Regardless of their age group, the priority is to create an environment that offers love and security, allows them to quickly return to their routines, and meets their physical, psychological, and social needs. Ensuring that they can continue their academic lives and participate in sports and artistic activities plays an important role in overcoming the traumatic process.

**Support for Children Aged 0-6**

Under normal conditions, the environment in which children aged 0-6 grow up, as well as the behaviors and communication styles of their parents or caregivers, play a crucial role in their physical, emotional, and social development. Being exposed to war or similar environments during this period can negatively affect their development, academic and professional lives, as well as personal and social relationships. Children aged 0-6 who have been in war zones may experience crying fits, waking up startled or crying, sleep disturbances, bedwetting, and bowel problems. Parents or caregivers are expected to be conscious and supportive in this regard. Despite all the difficulties, it is important to create a stable environment for infants, meet their basic needs (especially breastfeeding), ensure that caregivers for babies who have lost their parents do not change frequently, and provide familiar items and toys to help them adapt to the new environment. Physical intimacy, love, and security are crucial. Regular health check-ups and vaccinations must be carefully monitored. Play plays a significant role in the rehabilitation of war-affected children from the age of one. They should be given the opportunity to play in their environment. As they grow older, activities like music, drawing, storytelling, and drama, in addition to play, should be encouraged to help them express themselves and have fun (Bellamy, 2005).

**Support for Adolescents Affected by War**

Adolescents have a higher level of awareness and a better ability to understand events and foresee consequences compared to younger children. Therefore, they may need more attention and support. Parents, relatives, or specialists should listen to adolescents and share their fears and concerns. Creating a communication environment where adolescents can feel confident and encouraged is important. More importantly, ensuring their participation in activities that can eliminate the sense of hopelessness brought on by war is crucial.

**Support for Parents and Teachers**

Parents and teachers who are victims of war also need support in providing help to children. Therefore, it is necessary to include them in the psycho-social support programs designed for children and adolescents (Caffo and Belaise, 2003). In traumatic environments, children need the support of their parents and teachers more than ever. This is why the primary therapy is often aimed at families. In necessary situations, trauma can be addressed with cognitive, behavioral, and personal therapies. Children and adolescents should be kept away from violent news and images during wartime, not just in war-torn countries but around the world. Governments are also expected to take the necessary measures in this regard. If, despite these precautions, children witness scenes of war, it is important to be there for them, answer their questions, and try to provide explanations. Educating parents and teachers about the unusual reactions that children may develop after trauma is crucial for mitigating the long-term negative effects of war. It may not be easy for teachers to monitor children’s unusual reactions while also maintaining education, cultural, and sports activities at school, so it is essential to remember that they also need support and training.

**Psycho-social Support for Children Traumatized by War**

Providing individual or group psycho-social support to traumatized children is important. Sharing experiences among children who have been exposed to common traumas helps them feel less alone and promotes solidarity, hope for the future, and learning from positive examples on how to cope with difficulties. In the first stage of psycho-social support, children should be informed about how war environments affect people and the reactions that may occur during this process. These explanations can support children in expressing their emotions and controlling their fears and anxieties. Calming techniques, such as breathing and relaxation exercises, can also be used to help children cope with stress. After the war, it is crucial to create environments where children and

  

adolescents do not feel they have lost everything and can look toward the future with hope. Supporting them in developing a positive outlook is extremely important (Yule & others, 2000). In all forms of support provided to children after war, their best interests must be considered.

## CONCLUSION

In modern wars, many children die, and those who survive face severe physical and psychological problems. The inability to meet their most basic needs, access care and treatment, and the trauma of witnessing the deaths of loved ones and explosions profoundly affect them. More importantly, the problems that children face do not end with the cessation of war, as they often experience post-traumatic syndromes. It is necessary to provide treatment and psycho-social support to children and to those responsible for their care and education. However extensive and intense the psycho-social interventions for children after war may be, it is very difficult to completely erase the traces of violence. Therefore, it is essential to resolve ongoing political conflicts as soon as possible and keep civilians and children away from these conflicts. Considering the profound negative impact of war on children's entire lives, political leaders and societal authority figures must take on significant responsibilities to prevent new wars from breaking out.

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# KNOWLEDGE MAPPING OF ARTIFICIAL INTELLIGENCE FOR QUALITY ASSURANCE AND ACCREDITATION IN HIGHER EDUCATION: A BIBLIOMETRIC ANALYSIS (2015–2025)

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## ABSTRACT

Artificial intelligence (AI), machine learning, natural language processing, and predictive analytics are increasingly used to enhance quality assurance, measurement, assessment, and accreditation processes. Despite this growing adoption, research on AI applications for quality assurance and accreditation remains fragmented across disciplines, including education, information science, and management. A sample of 362 papers from the Scopus database was subjected to bibliometric analysis using the VOSviewer program. Using a dataset of 362 documents, co-authorship and country-level analyses reveal highly interconnected networks, with leading contributors including Al-Ali, Maytha and Almourad, Mohamed Basel, and prominent collaboration hubs in China, the United States, and the United Kingdom. Keyword co-occurrence mapping identifies three major thematic clusters: AI and machine learning technologies, higher education and pedagogy, and quality-focused research, highlighting the interdisciplinary nature of the field. Co-citation and author citation analyses identify foundational sources, such as Assessment and Evaluation in Higher Education, and influential authors, including Apostolou, demonstrating the intellectual structure of the domain. The findings advance theoretical understanding of the integration between technological innovation, pedagogical practices, and institutional quality frameworks. Practically, the study provides guidance for institutions to leverage AI for quality assurance, enhance curriculum design, and foster international research collaborations. Future research should explore emerging AI applications in accreditation, examine evolving collaboration networks, and empirically assess the impact of AI-driven interventions on student outcomes and institutional performance.

**Keywords:** *Accreditation, Artificial intelligence, Bibliometric analysis, Higher Education, Quality Assurance*

## Introduction

The integration of Artificial Intelligence (AI) into higher education has reshaped approaches to teaching, learning, and institutional management (Mariam et al., 2024). AI tools such as machine learning, natural language processing, and predictive analytics are increasingly used to enhance quality measurement, assessment, and accreditation processes (Hutson & Plate, 2023). These technologies facilitate objective evaluation of educational performance, automate quality assurance mechanisms, and support evidence-based decision-making for academic improvement (Chhetri, 2024). Consequently, AI has emerged as a critical enabler of accountability and innovation within global higher education systems (Aithal & Maiya, 2023).

Despite this growing adoption, research on AI applications for quality assurance and accreditation remains fragmented across disciplines, including education, information science, and management (Ugrekhelidze, 2025). While existing studies have examined the pedagogical and technological aspects of AI, there is limited systematic mapping of its contributions to institutional quality frameworks. The lack of a comprehensive overview of research trends, leading authors, and thematic developments in this domain has created a knowledge gap. Moreover, the recent period until 2025 marks a critical phase in higher education's digital transformation, accelerated by the COVID-19 pandemic, necessitating a closer examination of how AI supports post-pandemic quality assurance initiatives (Öziskender & Erdem, 2025).

To address these gaps, this study performs a bibliometric analysis to map and evaluate global research on Artificial Intelligence for quality assurance and accreditation in higher education between 2015 and 2025. Specifically, the study seeks to answer the following research questions:

  

1. What is the publication trend and research productivity in this field during 2015–2025?
2. What are the main research themes and emerging topics based on keyword co-occurrence analysis?
3. Which authors, sources, and documents have most influenced the intellectual structure of this domain?

The study employs three bibliometric techniques: performance analysis, co-word analysis, and co-citation analysis, utilizing tools such as VOSviewer to visualize publication patterns, thematic clusters, and citation networks.

By offering a systematic overview of this emerging field, the study contributes to understanding how AI is shaping modern approaches to quality assurance and accreditation in higher education. The findings provide practical implications for researchers, policymakers, and accreditation bodies aiming to leverage AI for institutional excellence and continuous quality improvement.

**Data analysis**

Bibliometric analysis is a well-established approach for evaluating research output in a particular subject area (Zyoud & Zyoud, 2021). It involves mining databases to extract publication-related variables such as authorship, sources, geographical distribution, and various indicators (Zyoud et al., 2024). Bibliometrics is a crucial tool for quantitative analysis in science, used by academics, government agencies, librarians, and researchers to assess the effectiveness of research (Pessin et al., 2022). There is increasing use of bibliometric analysis to identify research trends in specific fields (Hassan & Duarte, 2024). Bibliometrics is the study and measurement of publication patterns across all forms of written communication and their authors (Haba et al., 2023). Through examining citation frequency, keyword frequency, authors, h-index, and publication types, bibliometric analysis offers valuable insights into targeted research fields. This study discusses and concludes and the context of artificial intelligence for quality assurance and accreditation in higher education while providing recommendations for future research directions.

**Method**

**Bibliometric mapping**

Bibliometric mapping facilitates the analysis of a discipline's history and structure, the dissemination of knowledge within the field, the impact of journals, and the citation status of publications over time (Gan et al., 2022). By integrating bibliometric mapping, one can visualize the most prolific authors, institutions, and nations within a specific topic for subsequent analysis, thus revealing trends in literature creation over time. This is essential for delineating and summarizing disciplines. Educational technology, as a dynamic field, requires reflection on its developmental trajectory, assessment of its present condition, and forecasts of forthcoming developments. As a result, bibliometric analysis has emerged as a distinctive analytical approach, garnering considerable interest and frequent use in the domain of educational technology in recent years, thereby becoming a focal point for numerous academics (Chen et al., 2021). Consequently, it serves as a suitable instrument for this analysis as it quantifies scientific activity and its consequences through the measurement of publications and citations attributed to an individual, research group, institution, or country.

**Database**

This study's bibliometric analysis began by identifying the databases utilised to search for research in the fields of Artificial Intelligence for quality assurance and accreditation in higher education. The database chosen for this research was Scopus. Scopus is an abstract and citation database comprising peer-reviewed scientific literature. Upon its inception, it comprised over 27 million publishing records

  

spanning from 1966 to 2004. As of the current writing, the database comprises approximately 76 million entries, encompassing publications from 1788 to 2019, positioning it as one of the largest curated bibliographic abstract and citation databases available today (Baas et al., 2020).

**Keyword identification**

Keyword identification is “a critical phase of bibliometric analysis”. A comprehensive list of keywords will “facilitate comprehensive and integrated queries, guaranteeing that the search exercise encompasses all research articles within the designated knowledge domain” (Kusumawat et al., 2024). In this study, the filters for search date, file type, and terms/keywords have been organized systematically. Research published between 2015 and 2025 on academic platforms in all areas was retrieved. The articles must include the terms ("Artificial Intelligence" OR "Machine Learning" OR "Learning Analytics") AND ("Higher Education" OR "Universities" OR Tertiary Education) AND ("Quality Assurance" OR "Accreditation" OR "Quality Measurement" OR "Quality Evaluation") in the title, abstract, or keywords across all fields. Articles written in languages other than English were excluded from the selection. The article title, abstract, and keywords were selected in the search section. A total of 362 published articles related to the keywords given above were accessed (Access date:11 November 2025). Articles were limited to all subject areas, document type was limited to “articles, conference papers, conference review and book chapters and articles” published only in the English language were retrieved. Subsequently, the complete record and cited references was downloaded in CSV file format for bibliometric mapping.

**Analysis**

This study conducted bibliometric analysis of 362 research publications to assess the scope and nature of contributions in the field.

**Co-authorship collaboration**

Figure 1 depicts the collaborative partnerships in co-authorship among authors. The initial filtering process involved applying a criterion that required a minimum of 2 documents by an author deemed to be relevant. Strong significant collaboration was observed among the targeted authors in this domain. The top 10 authors are reported in Table 1. The results of the co-authorship analysis show that Al-Ali, Maytha, Almourad, Mohamed Basel, Dawson, Shane P., Gašević, Dragan, Hussain, Mohammed Abdulla, Marks, Adam A., Rietsema, Kees, Rybiński, Krzysztof, and Samuel Mathew, Sujith Samuel were the most productive authors in the field under investigation.

Table 1: Publication trend (Authors Productivity-Co-authorship analysis)

| Author | Documents | Citations | Total Link Strength |
|---|---|---|---|
| Al-Ali, Maytha | 2 | 31 | 4 |
| Almourad, Mohamed Basel | 2 | 25 | 4 |
| Dawson, Shane P. | 2 | 66 | 3 |
| Gašević, Dragan | 2 | 79 | 1 |
| Hussain, Mohammed Abdulla | 2 | 25 | 4 |
| Marks, Adam A. | 2 | 31 | 4 |
| Rietsema, Kees | 2 | 31 | 4 |
| Rybiński, Krzysztof | 2 | 28 | 0 |
| Samuel Mathew, Sujith Samuel | 2 | 25 | 4 |

  

These authors not only contribute significantly in terms of publication volume but also appear prominently within the collaboration network, suggesting that they play influential roles in shaping the research landscape of this topic. Their recurring co-authorship links highlight their involvement in sustained research groups or cross-institutional partnerships.

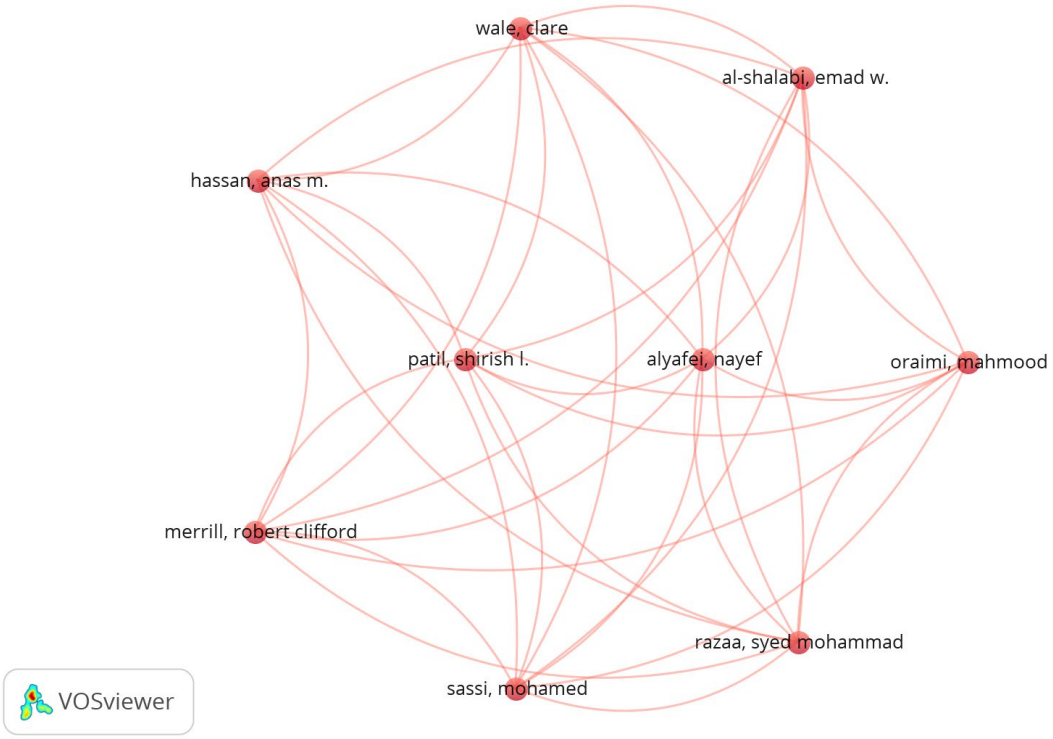


Figure 1: Authors Productivity (Co-authorship analysis)

This network-based analysis offers "an advanced analytical technique, as it visually maps interconnections, identifies key contributors", and reveals regional or cross-national trends in collaborative research. In addition, the analysis reveals collaboration dynamics that may affect both the quality and the heterogeneity of research outcomes.

The network map displayed distinct clusters, each represented by a certain colour. While the strength of collaborative ties was reported to be higher within the clusters, researchers from other clusters collaborated to publish research material in this field (see Table 2).

The country-level co-authorship analysis shows that research on AI-driven quality assurance in higher education is highly internationalized, with notable differences in productivity and collaboration. China leads in research output with 106 documents and 693 citations, although its collaboration intensity is moderate (total link strength 18). The United States and the United Kingdom, despite having fewer publications than China, demonstrate the strongest international connections, with total link strengths of 25 and 20, respectively, underscoring their central roles in global knowledge exchange.

Saudi Arabia, India, Spain, Germany, and the United Arab Emirates also exhibit substantial involvement, characterized by a moderate publication volume and strong collaborative ties. Countries such as Australia and Indonesia contribute to the field but exhibit lower levels of collaboration. Overall, the results indicate that North America, Europe, and parts of Asia serve as key hubs in the global collaboration network, driving cross-border partnerships and advancing research in this domain (see Figure 2).

  

Table 2: Co-authorship of countries

| Country | Documents | Citations | Total Link Strength |
|---|---|---|---|
| Australia | 10 | 139 | 3 |
| China | 106 | 693 | 18 |
| Germany | 12 | 90 | 10 |
| India | 25 | 115 | 12 |
| Indonesia | 12 | 79 | 2 |
| Saudi Arabia | 19 | 196 | 19 |
| Spain | 15 | 51 | 13 |
| United Arab Emirates | 10 | 107 | 13 |
| United Kingdom | 22 | 207 | 20 |
| United States | 37 | 269 | 25 |

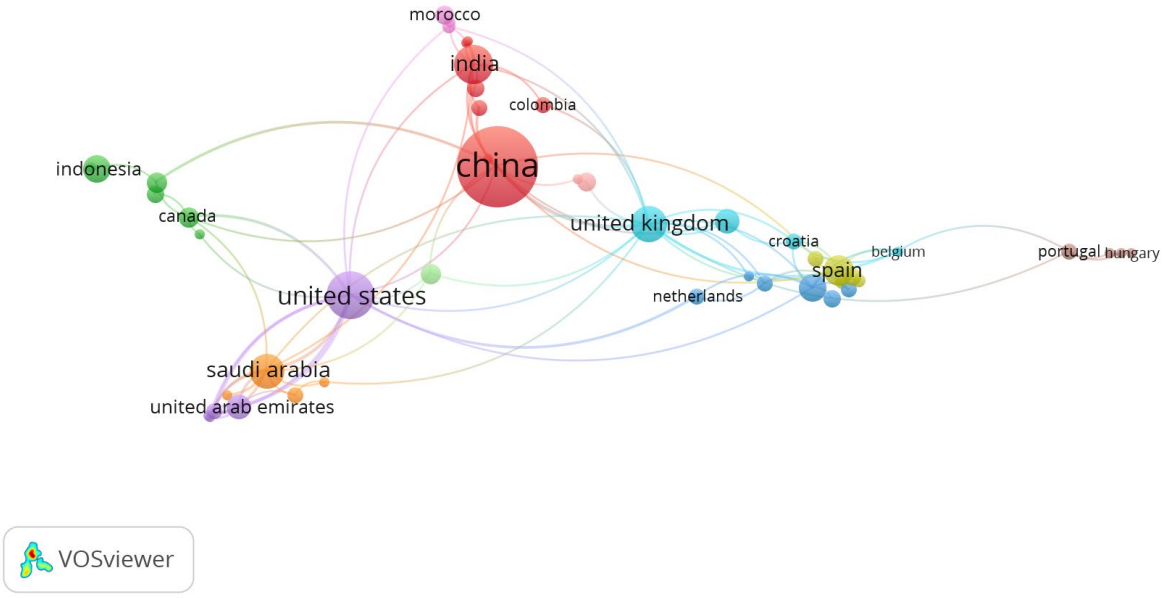


Figure 2: Countries' Contribution

**Co-occurrence network of all keywords**

The primary objective of examining keyword co-occurrence using network visualization is to explore the interconnectedness of terms scholars use in a specific research field. This study seeks to understand the whole knowledge framework of this topic. Accordingly, VOSviewer was utilized to produce a network graph that facilitates a visual analysis of term co-occurrence.

Co-occurrence analysis of all keywords was applied to conceptualize the development and growth of selected keywords as indicated in the "Keyword Identification" section of this manuscript. Following

  

Anas et al. (2023), a minimum threshold of 10 for the co-occurrence of a particular keyword was required and filtered to arrive at a meaningful analysis. 42 keywords met the requirement.

The keyword co-occurrence analysis reveals the thematic structure of research linking artificial intelligence and quality assurance in higher education. Artificial Intelligence is the most dominant term, appearing 130 times with the highest total link strength (511), indicating its central role in connecting all other concepts. Closely related terms such as Machine Learning (74 occurrences; TLS 277) and Engineering Education (51 occurrences; TLS 244) highlight the strong technological and applied education focus within the field (see Table 3).

Keywords related to the educational context; Higher Education (61 occurrences; TLS 263), High Educations (46; TLS 262), Students (89; TLS 485), and Teaching (68; TLS 375) form another major cluster, reflecting the consistent emphasis on learner-centered and pedagogical applications of AI. Meanwhile, quality-related terms such as Quality Assurance (81 occurrences; TLS 359), Quality Control (84; TLS 449), and Quality Evaluation (46; TLS 251) represent a strong cluster, showing the field's focus on institutional quality processes (see Figure 3).

The network suggests that research in this area is organized around three interconnected themes: AI/ML technologies, educational practices, and quality assurance mechanisms. The strong link strengths across these clusters indicate a highly integrated and evolving research landscape. Figure 4 illustrates research themes and emerging topics over the years.

Table 3: main research themes and emerging topics (Co-occurrences Analysis)

| Keyword | Occurrences | Total Link Strength |
|---|---|---|
| Artificial Intelligence | 130 | 511 |
| Engineering Education | 51 | 244 |
| High Educations | 46 | 262 |
| Higher Education | 61 | 263 |
| Machine Learning | 74 | 277 |
| Quality Assurance | 81 | 359 |
| Quality Control | 84 | 449 |
| Quality Evaluation | 46 | 251 |
| Students | 89 | 485 |
| Teaching | 68 | 375 |

  

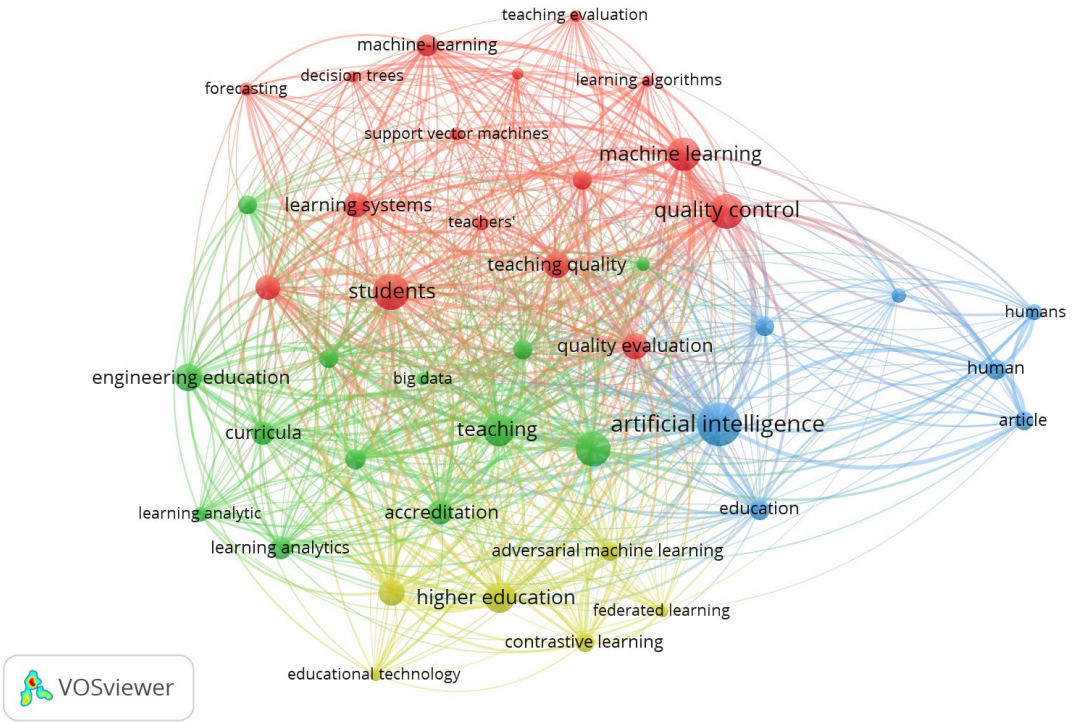


Figure 3: Research themes and emerging topics (Co-occurrences Analysis)

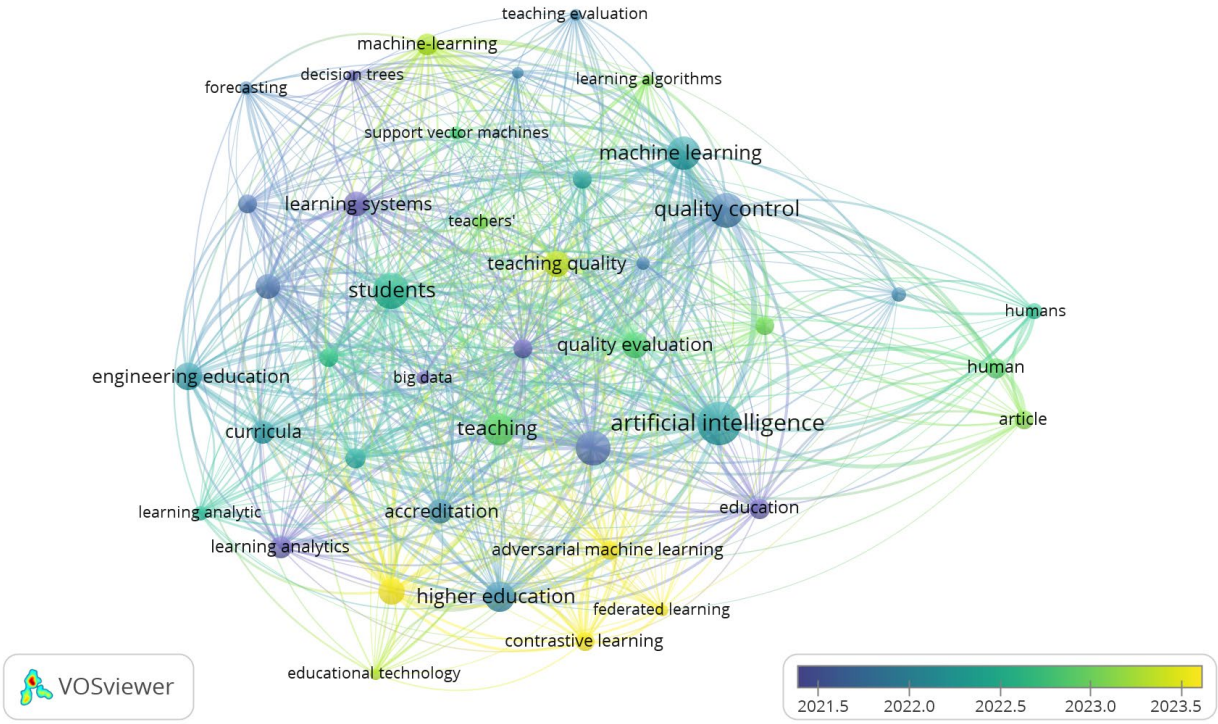


Figure 4: Themes and emerging topics over the years

  

**Most cited sources**

The co-citation analysis indicates that the field is strongly shaped by higher education and technology-focused journals. Assessment and Evaluation in Higher Education is the most influential source, with 7 citations and the highest link strength (9), followed by Higher Education, which has 7 citations (TLS 4). Technology-related journals such as Computers and Education (6 citations, TLS 4) and Education Sciences (4 citations, TLS 4) also play key roles, reflecting the integration of AI and digital learning research (see Table 4).

Discipline-specific sources such as Journal of Chemical Education (5 citations, TLS 5) and Journal of Engineering Education (7 citations, TLS 3) offer additional but more specialized contributions. Other journals, including ACM International Conference Proceedings Series and Sustainability (Switzerland) (each 5 citations), serve supporting roles, while sources with low link strength remain peripheral. The citation pattern underscores the dominance of quality assurance and technology-enhanced learning literature in shaping this research area (see Figure 5).

Table 4: Productivity trend- Most cited sources (Co-citation)

| Source | Citations | Total Link Strength |
|---|---|---|
| Acm International Conference Proceeding Series | 5 | 2 |
| Assessment And Evaluation In Higher Education | 7 | 9 |
| Computers And Education | 6 | 4 |
| Education Sciences | 4 | 4 |
| Higher Education | 7 | 4 |
| International Journal Of Radiation Oncology Biology Physics | 5 | 0 |
| Journal Of Accounting Education | 5 | 0 |
| Journal Of Chemical Education | 5 | 5 |
| Journal Of Engineering Education | 7 | 3 |
| Sustainability (Switzerland) | 5 | 4 |

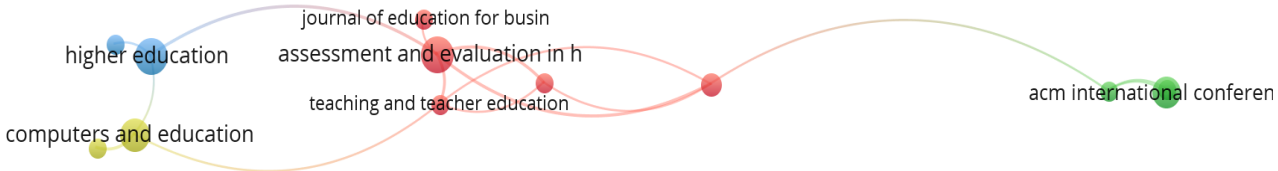


Figure 5: Productivity trend (Most cited sources-Co-citation Analysis)

**Most cited authors**

Co-citation analysis of most influential authors was performed. The minimum document of an author was determined to be 3, 25 authors met the requirement. The analysis of the most cited authors shows that influence within this research domain is concentrated among a few key contributors. Apostolou and Barbara A. stand out with 5 citations each and the highest total link strength (25), indicating that their work is not only frequently cited but also strongly connected to other influential studies. Authors such

  

as Cojocaru A. and Dorian (both 4 citations, TLS 16) also play significant roles, reflecting solid integration within the broader scholarly network.

Other authors, including Fie (6 citations, TLS 9) and Romero (4 citations, TLS 9), contribute a moderate influence with notable connections across related publications. In contrast, authors like John T. (4 citations, TLS 0) and M. (3 citations, TLS 3) appear more peripheral, showing fewer co-citation linkages despite being cited. Overall, the pattern suggests a core group of highly interconnected scholars driving the intellectual structure of the field (see Table 5). Figure 6 present a graphical representation of most influential authors.

Table 5: Citation analysis of influential authors

| Author | Citations | Total Link Strength |
|---|---|---|
| Apostolou | 5 | 25 |
| Barbara A. | 5 | 25 |
| Brown | 5 | 5 |
| Cojocaru A. | 4 | 16 |
| Dorian | 4 | 16 |
| Educon | 4 | 7 |
| Fie | 6 | 9 |
| John T. | 4 | 0 |
| M. | 3 | 3 |
| Romero | 4 | 9 |

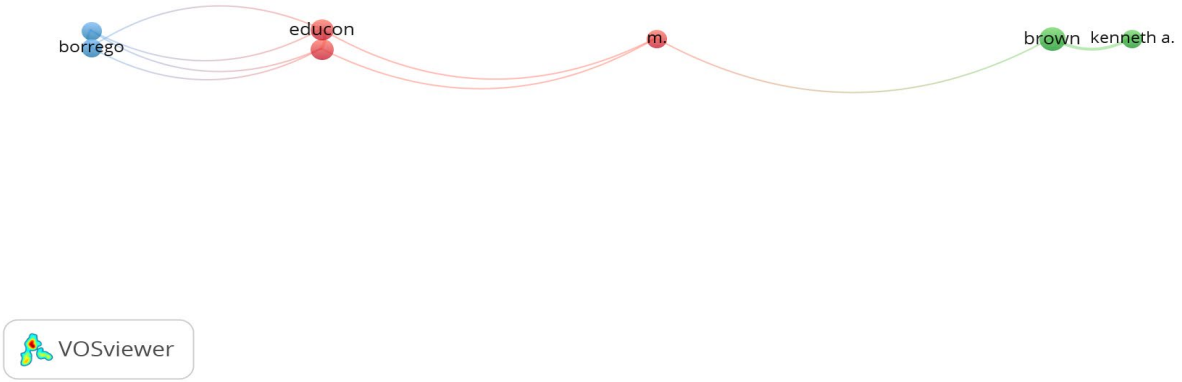


Figure 6: Influential authors (Co-citation of authors)

  

## Discussion

The bibliometric analysis reveals a highly interconnected and interdisciplinary research landscape on AI, machine learning, and learning analytics in higher education quality assurance. Co-authorship analysis highlights strong collaboration among scholars, with leading contributors such as Al-Ali, Maytha and Almourad, Mohamed Basel driving research development. At the country level, China leads in publication volume (106 documents, 693 citations), while the United States (37 documents, TLS 25) and the United Kingdom (22 documents, TLS 20) demonstrate the strongest international collaboration, indicating the presence of global knowledge hubs.

Keyword co-occurrence mapping identifies three major thematic clusters: AI and machine learning technologies (Artificial Intelligence, Machine Learning), higher education and pedagogy (Higher Education, Students, Teaching), and quality-focused research (Quality Assurance, Quality Control, Quality Evaluation). Co-citation and author citation analyses reveal the foundational literature and influential authors shaping the field, including Assessment and Evaluation in Higher Education (7 citations, TLS 9) and Apostolou (5 citations, TLS 25). Overall, research in this area demonstrates a synergistic integration of technology, pedagogy, and institutional quality management.

## Theoretical Implications

The findings advance theoretical understanding by highlighting the integration of technological and quality frameworks, the role of collaborative networks in knowledge creation, and the value of interdisciplinary approaches. These insights suggest that AI-driven interventions in higher education can be conceptualized through combined models of technological innovation, pedagogical improvement, and institutional quality assurance.

## Practical Contributions

For practitioners, the study offers several actionable insights. Institutions can leverage global collaboration networks and influential research to guide AI adoption for quality assurance and accreditation. The prominence of student- and teaching-related keywords underscores the potential for integrating AI and learning analytics into curricula to enhance learning outcomes. Additionally, identifying productive countries and authors supports international partnerships and collaborative research initiatives.

## Future Research Directions

Future studies should examine emerging AI applications in quality measurement and accreditation, explore the evolution of co-authorship and country networks over time, and develop interdisciplinary theoretical models combining AI, pedagogy, and quality assurance. Empirical research linking AI-driven interventions to student outcomes and institutional accreditation will further validate and extend the insights from this bibliometric mapping.

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# MEDIA REPRESENTATION AND PUBLIC REACTIONS TO AI-BASED TRAFFIC CAMERAS: THE CASE OF NORTHERN CYPRUS

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**Abstract**
This study examines how AI-supported traffic camera systems are represented in the media and how these representations shape the public's perceptual and behavioral responses. It is based on the assumption that media content does more than transmit information, it transforms surveillance into a socially learned experience. Within this framework, Emel Yılmaz proposes the *Perceptual Surveillance Learning Theory (PSLT)*, which conceptualizes surveillance not merely as a mechanism of control but as a learning process structuring social perceptions, ethical judgments, and public reactions. The theory integrates Foucault's notion of the disciplinary society, Castells' concept of the network society, Bandura's social learning theory, and Habermas's idea of the public sphere to explain how surveillance culture is internalized through media discourse. The case study conducted in Northern Cyprus shows that newspapers with differing ideological orientations frame surveillance in contrasting ways: left-leaning media present it as a violation of privacy and personal freedom, while centrist and right-leaning outlets legitimize it as essential for public safety and social order. These representations reveal how compliance, anxiety, resistance, and acceptance toward surveillance are socially learned through mediated discourse. Accordingly, this study conceptualizes surveillance as a social experience shaped by perceptual learning at the individual level and by the formation of behavioral responses within the public sphere, offering an original conceptual and contextual contribution to the literature on surveillance culture.

**Keywords:** Artificial intelligence, surveillance cameras, privacy, media representation, behavioral response, Northern Cyprus, Perceptual Surveillance Learning Theory

Emel Yılmaz[1] holds a Ph.D. in Communication Sciences and is an academic at the Department of Visual Communication Design at the American University of Cyprus in Nicosia, North Cyprus. She also serves as the Director of the Continuous Education Center, the Coordinator of Communication and Press Affairs, and the University's Representative for External Relations. Her research interests include communication studies, public relations, journalism, political communication, cultural studies, and popular culture. Dr. Yilmaz's scholarly work explores the intersections of media, society, and culture, focusing on how communication and popular culture shape social perception, identity formation, and political discourse.

## 1. Introduction

In recent years, the rapid integration of artificial intelligence into surveillance infrastructures has profoundly redefined the boundaries between technology, society, and individual privacy. Once associated merely with ensuring public safety, traffic camera systems have evolved into complex socio technical networks that not only monitor but also normalize surveillance in everyday life. The growing use of AI-based visual recognition technologies enables the continuous collection and analysis of behavioral data, reinforcing new forms of visibility, control, and consent. This transformation has intensified scholarly debates on the ethical, political, and psychological dimensions of surveillance and made questions about how societies perceive, interpret, and respond to such systems increasingly critical (Foucault, 1975, pp. 200–204; Lyon, 2018, pp. 56–59).

Surveillance technologies, one of the defining features of the digital age, should no longer be understood solely as tools for monitoring individual behavior but as cultural forms that reshape social relations, the public sphere, and notions of personal privacy. In particular of the defining features of the digital age, should no longer be understood solely as tools for monitoring individual behavior but as cultural forms that reshape social relations, the public

  

sphere, and notions of personal privacy. In particular, AI-supported traffic cameras represent not merely a technological regulation but a form of power expressed through visibility.

This visibility corresponds to Michel Foucault's concept of panopticism as articulated in *Discipline and Punish* (Foucault, 1975). For Foucault, modern power operates not only through physical coercion but through an internalized perceptual awareness that compels individuals to regulate their own conduct. The individual, constantly aware of the possibility of being seen, becomes both the subject and the object of surveillance. Power thus shapes not only bodies but perceptions; surveillance ceases to be an external imposition and becomes a learned, internalized mode of self-governance.

The media constitutes one of the most critical domains in which the multidimensional nature of surveillance is produced and circulated. News discourse does not merely report on surveillance; it interprets, legitimizes, and at times normalizes it. As Habermas (1989, pp. 86–88) emphasized in his theory of the public sphere, the media are not simply channels for transmitting information; they are communicative arenas where social consensus, critique, and power relations are continually renegotiated. Accordingly, understanding how surveillance technologies are represented in media discourse is essential to comprehending how societies learn and internalize the logic of surveillance (Couldry & Hepp, 2017, pp. 94–96).

Castells's (2009, pp. 423–425) concept of the "network society" underscores that communication in the digital age operates within horizontal and interconnected systems. In such a society, surveillance is produced not only vertically from the state or institutions but also horizontally through social networks and algorithmic participation. This dynamic reshapes behavioral responses, generating patterns of obedience, resistance, consent, or indifference. Bandura's (1977, pp. 40–43) *Social Learning Theory* provides a strong foundation for understanding this process: individuals do not merely witness surveillance; they learn it through mediated representations.

One of the most subtle yet profound effects of technological progress is that surveillance has become not only physical but also a digital and cognitive experience. AI-powered monitoring systems, now an inseparable part of urban life, blur the boundaries between security, control, and ethics. These systems record not only behavior but also shape the way societies perceive and conceptualize surveillance itself. In the context of Northern Cyprus, the ways in which such technologies are legitimized, contested, or internalized in the public sphere provide a valuable lens through which to analyze local social experience (Yılmaz & Bektaş, 2019b, p. 64).

The scope of analysis is limited to mainstream news media and official digital platforms in Northern Cyprus; however, this focus provides a strong contextual framework for understanding the local social dynamics that shape public responses to surveillance. By analyzing the discursive framing of news articles and official Facebook communications in the Turkish Republic of Northern Cyprus (TRNC), this study explores how surveillance is constructed along the axes of privacy, security, and consent. In doing so, it contributes to the limited body of research in this area by offering an original perspective that integrates behavioral and sociological dimensions of surveillance culture (Yılmaz, 2025, pp. 1456–1459).

Methodologically, this research employs a qualitative discourse analysis approach. News coverage related to surveillance technologies was examined in terms of discursive framing, conceptual metaphors, and patterns of representation. The scope of analysis is limited to the printed press in Northern Cyprus; however, this focus provides a strong contextual framework for understanding the local social dynamics that shape public responses to surveillance.

Within this framework, the Perceptual Surveillance Learning Theory (PSLT) conceptualizes surveillance not as a mechanism for regulating individual behavior but as a cultural experience learned and reproduced through media. The theory intersects Foucault's (1975) notion of panopticism, Castells's (2009) network society, Bandura's

  

(1977) social learning model, and Habermas's (1989) theory of the public sphere to construct an original theoretical foundation.

The Perceptual Surveillance Learning Theory frames surveillance as a process that is simultaneously behavioral, perceptual, and ideological. Surveillance practices function across three interrelated dimensions: social learning, cultural internalization, and media-based normalization. Within this cycle, individuals develop learned public reactions through mediated representations, sometimes manifesting as trust and conformity, and other times as resistance or ironic detachment. This iterative process explains how surveillance becomes normalized and embedded within digital public life and everyday culture.

Accordingly, this study redefines the relationship between surveillance, media, and behavior through a behavioral-sciences perspective, offering both a theoretical and a locally grounded contribution to the literature. Surveillance is no longer merely a mechanism of control; it is a learned, felt, and culturally shared experience.

In the following section, the theoretical foundations of surveillance will be elaborated upon through three key dimensions: perceptual, representational, and ideological, drawing on Foucault's analysis of power and knowledge, Bandura's observational learning, and Habermas's communicative concept of the public sphere as the main pillars of the Perceptual Surveillance Learning Theory.

**2. Theoretical Framework**

This study draws upon the critical tradition of discourse analysis, integrating theoretical insights from Michel Foucault, Albert Bandura, and Jürgen Habermas, while extending them through contemporary frameworks developed by Teun A. van Dijk, Ruth Wodak, Norman Fairclough, and Stuart Hall. Together, these scholars illustrate that surveillance and political communication are not merely technical or institutional phenomena but deeply discursive and ideological constructions (Van Dijk, 1993, 2006; Wodak, 2002, 2007; Fairclough & Wodak, 1997; Hall, 1998; Eagleton, 2011).

Foucault's analysis of disciplinary mechanisms reveals how visibility operates as a subtle form of power, producing subjects who internalize surveillance as part of social order (Foucault, 1975). Bandura's *Social Learning Theory* (1977, 1986) explains how individuals acquire perceptual and behavioral norms through observation, imitation, and social reinforcement. Habermas (1989), by conceptualizing the public sphere as a communicative domain of shared meaning, connects these dynamics to the ideological structures of media discourse.

This theoretical foundation is expanded by the critical discourse analysis approaches of Van Dijk, Wodak, and Fairclough, who emphasize the relationship between language, ideology, and power. Van Dijk's socio-cognitive model (1993, 2006) demonstrates how mental representations sustain social hierarchies, while Wodak's discourse-historical approach (2002, 2007) situates language within institutional and political contexts.

Fairclough (1995) complements these by framing discourse as both a medium and a site of social struggle, where hegemony is linguistically reproduced.

In the Turkish context, this critical orientation is deepened by the contributions of scholars such as İnal (1996), Binark (2007), Gazioğlu Terzi (2014), Doyuran (2018), and Sancar (2008), who have shown how ideological power and gendered representation are embedded in media narratives and visual culture. These works collectively reveal that surveillance, representation, and communication are intertwined cultural processes shaped by ideology and perception.

The theoretical aim, therefore, is to conceptualize surveillance not as a static mechanism of control but as a learned discursive practice, a form of social learning. This perspective unites Foucault's disciplinary power, Bandura's social learning, and Habermas's communicative rationality within the broader framework of critical discourse

  

theory, providing a comprehensive foundation for analyzing how individuals learn to participate in and reproduce the culture of surveillance.

**2.1. Foucault and the Perceptual Foundations of Surveillance**

Michel Foucault's (1975, 1987) conceptualization of discipline and the Panopticon illustrates how modern power relies on continuous observation and normalization. This idea parallels the analytical stance of Van Dijk (1983), who argues that power is reproduced through discourse structures, and Wodak (2002), whose discourse-historical approach situates communication within socio-political contexts.

In Turkey, Gazioğlu Terzi (2014) and Sancar (2008) demonstrate similar dynamics, showing how political discourse constructs gendered and ideological hierarchies within parliamentary speech. These processes exemplify Foucault's "microphysics of power," in which individuals internalize norms through exposure to dominant discourses.

Elbirlik (2015) and Elbirlik and Karabulut (2015) emphasize that the discursive systems in Ottoman and early modern Turkish political thought also functioned as instruments of ideological control. This continuity between classical and contemporary discourse further supports Foucault's claim that power is sustained through normalization and representation rather than overt coercion.

**2.2. Bandura and the Social Learning of Surveillance: From Observation to Internalization**

Albert Bandura's *Social Learning Theory* (1977, 1986) offers a framework for understanding how surveillance is learned behavior. Observation, imitation, and reinforcement are central to how individuals adopt the values and expectations presented through media.

As Bayraktutan et al. (2012, 2013) and Aziz (2013) show, digital communication platforms transform political participation into a cycle of mediated observation, in which citizens simultaneously observe, imitate, and internalize the behaviors of political actors. Similarly, Aygül (2013) and Çomu (2012) demonstrate that new media spaces such as Facebook and YouTube produce environments where ideological narratives and surveillance norms are emotionally reinforced. Within this learning framework, Van Dijk (2006) conceptualizes ideology as the mental architecture that organizes social knowledge, while Wodak (2007) highlights the linguistic strategies through which these ideologies are enacted and legitimized. Together, these models reveal that surveillance functions not only through technology but also through learned cognitive and emotional adaptation.

**2.3. Habermas and the Public Sphere of Surveillance**

Jürgen Habermas's concept of the public sphere provides a crucial framework for understanding how surveillance discourse operates as a communicative and ideological practice within society. In *The Structural Transformation of the Public Sphere* (1989), Habermas defines the public sphere as a domain of rational and critical debate where citizens form opinions through communication rather than coercion. However, in the digital age, this sphere has become increasingly mediated by institutions of representation, most notably the media.

Within this mediated environment, surveillance ceases to be a purely technical process and becomes a communicative phenomenon. Media discourse frames, interprets, and legitimizes surveillance through language and imagery that shape collective understanding. The framing of surveillance as either a necessity for public safety or a violation of personal privacy reflects ideological struggles over the definition of normality and freedom (Habermas, 1989; Fairclough, 1995; Wodak, 2002).

In this regard, Yılmaz and Bektaş (2019b) provide empirical evidence showing that media outlets do not merely reflect but actively reproduce ideological boundaries through linguistic framing. Their analysis of Cypriot newspapers demonstrates that national identity and ideological positioning are constructed and maintained discursively through the reproduction of dominant political narratives. Yılmaz (2019) further elaborates that these

  

media discourses are not neutral but pedagogical in nature, teaching audiences how to interpret identity, ideology, and visibility within a polarized public sphere.

The Perceptual Surveillance Learning Theory (PSLT) builds upon this communicative and ideological framework by conceptualizing the media as a pedagogical actor within the public sphere. Through repetitive visual and textual representations, audiences learn not only what to think about surveillance but also how to feel about it. Each news narrative, photograph, or editorial functions as a micro-lesson in civic behavior, subtly instructing citizens on acceptable emotional and ethical responses.

This dynamic aligns with Habermas's notion of communicative action, wherein social understanding emerges through the interaction of meaning, validity, and consensus. In the context of mediated surveillance, the process of learning to consent replaces rational deliberation with affective normalization. As Foucault's disciplinary power and Bandura's behavioral learning intersect within this sphere, surveillance becomes a shared language of visibility, a social grammar of observation and acceptance (Habermas, 1989; Bandura, 1977; Foucault, 1975).

Through this lens, the public sphere becomes the cognitive and emotional space where surveillance culture is collectively constructed. Media representations operate as sites of social pedagogy, teaching audiences the language of compliance and visibility. Thus, Habermas's public sphere converges with the perceptual logic of surveillance, forming a communicative loop where perception, ideology, and consent are co-produced (Habermas, 1989; Yılmaz, 2019; Yılmaz & Bektaş, 2019b).

**2.4. Ideology, Representation, and Discursive Power**

Ideology, as Eagleton (2011) defines it, functions as the symbolic glue binding perception to power. Hall (1998) adds that representation is the central mechanism through which ideology becomes meaningful. Following Fairclough (1995), Wodak (2007), and Van Dijk (2006), this study conceptualizes media discourse as a site where surveillance and consent intersect, showing that citizens learn not only what to believe but also how to see themselves being seen. In this context, Yılmaz (2019) highlights that in the Cypriot media, identity and ideology are continuously negotiated through the repetition of symbolic and discursive patterns. This process not only reflects power relations but also constitutes them by teaching audiences how to perceive national belonging and civic responsibility. Similarly, Yılmaz and Bektaş (2019b) show that ideological discourse operates through the normalization of difference, framing certain political ideologies as natural while marginalizing others.

Within Turkish media, İnal (1996) and Tokgöz (1993, 1994) demonstrate how ideological structures are linguistically constructed through framing and repetition, producing consent and emotional alignment with authority. Keskin (2015) and Toruk and Sine (2012) extend this argument, showing how televised debates and political news replicate power through discursive cues that reinforce hegemonic narratives.

At a broader theoretical level, Jørgensen and Phillips (2002) and Phillips and Hardy (2002) emphasize that discourse functions as both a methodological lens and a social process, mediating between symbolic systems and material practices. Howarth and Griggs (2016) and Ercan and Marsh (2016) further underline the value of qualitative analysis for revealing how ideology is produced and circulated within political communication.

Ultimately, surveillance and ideology converge as mutually reinforcing processes. Individuals learn the language of compliance, while media narratives naturalize visibility as civic virtue. This synthesis aligns with the foundational insights of Foucault (1975), Van Dijk (2006), Wodak (2007), and Habermas (1989), revealing that the modern subject is simultaneously the watcher and the watched, learning participation through discourse and perception (Yılmaz, 2019; Yılmaz & Bektaş, 2019b).

  

## 3. Materials and Methods

This research aims to examine the debates surrounding AI-supported traffic cameras that took place in the Turkish Republic of Northern Cyprus (TRNC) during the summer of 2025. The study specifically analyzes the official statements made by the Ministry of Public Works and Transportation on its official Facebook page, as well as how these statements were reproduced, interpreted, and discussed in the media and among the public. The main objective is to reveal how social media, as a tool of political communication, transforms digital forms of the public sphere, particularly in times of crisis.

Data were collected from Facebook and online news platforms. The research universe includes posts from the official Facebook page of the Ministry of Public Works and Transportation, user comments on these posts, and newspaper articles reflecting the same debates (Kıbrıs Postası, Yenidüzen, Topuz, Gıynık, and MHA News). In addition, statements made by Turan Büyükyılmaz, Deputy Chairman of the Rebirth Party (YDP), were included in the sample, as they represent different ideological emphases and legitimation strategies within the same political discourse.

The dataset consists of social media content and news texts published between April and September 2025. This period was deliberately chosen to encompass the preparatory phase before the cameras were activated, the peak of public reaction, and the subsequent discursive shift in the government's communication. Thus, both digital public responses and the rhetorical strategies of political actors could be compared within the same time frame.

The study employs Teun A. van Dijk's Critical Discourse Analysis (CDA) model as the analytical framework. This approach enables the examination of how ideologies and power relations are constructed, legitimized, and reproduced through discourse (Van Dijk, 2001; Fairclough & Wodak, 1997). Within this framework, both written (newspaper articles, official statements) and visual-verbal (social media posts, televised remarks) texts were analyzed in terms of linguistic structure, lexical choices, narrative form, persuasion strategies, and contextual indicators (İnal, 1996).

Van Dijk's model of news discourse analysis was later systematized in tabular form by Özer (2009) and adapted to social media interactions by Bayraktutan et al. (2013) and Çomu and Halaiqa (2014). Following these adaptations, this study evaluates the "comments" section of Facebook posts as the primary interactional domain reflecting citizen participation. User comments were analyzed as discursive indicators that demonstrate public reactions and the direction of the ongoing debate.

The analysis process was also interpreted through the lens of behavioral-cognitive theory. This perspective allows for the assessment of individuals' responses to surveillance discourse not only on a linguistic level but also in cognitive and emotional dimensions. The behavioral-cognitive framework posits that individuals are active agents who interpret environmental stimuli, construct meaning, and restructure their reactions accordingly. Within this context, the individual in social media environments is viewed not merely as a respondent but as a meaning-making and position-taking actor. Hence, the findings of discourse analysis are interpreted within the dynamic interaction between individual perception, the sense of privacy, and social cognition.

## 4. Results and Discussion

### 4.1. Surveillance Discourse and Public Reaction: Contradictory Discourses in Media and Social Media

The announcements regarding the implementation of artificial intelligence-based traffic cameras initiated an intense public debate in the Turkish Republic of Northern Cyprus (TRNC) in August 2025, centered on the themes of security, order, and privacy. This debate was not limited to the technical introduction of a system but created a multilayered arena of negotiation between the state's security- and order-oriented discourse and the citizen's privacy-based counter-discourse. Throughout the process, traditional media, social media, and official statements

  

formed an interconnected discursive chain in which headlines, posts, and comments carried the same event into different ideological worlds of meaning (Van Dijk, 2001; Fairclough & Wodak, 1997)

#### 4.1.1. Macro-Level Discursive Structure

The macro-level discourse analysis examines the general ideological structure of the debates surrounding AI-supported traffic cameras through media discourse, political statements, and social reflections. At this level, the social meaning of surveillance is reproduced through the thematic organization of news, headline selection, and the positioning of actors (İnal, 1996; Özer, 2009).

August 2025 marked a period of intense discursive polarization in the TRNC media landscape following the introduction of AI traffic cameras. Kıbrıs Postası and Gıynık legitimized surveillance through the notions of modernization, civilization, and order, while Yenidüzen, Topuz, and Kıbrıs Objektif framed the issue around privacy, the inviolability of private life, and rights-based citizenship. In this way, the media became an ideological arena mediating between the state's official discourse of security and the citizen's demand for individual freedom.

News published in *Kıbrıs Postası* (August 7, 2025) included statements from the Ministry of Public Works and Transportation emphasizing that AI cameras were necessary for public safety and the maintenance of order. The ministry underlined that the system would record "only when a crime is committed," thereby legitimizing technological surveillance as a matter of public benefit. In this discourse, state authority was equated with public security, while individual privacy was subordinated in favor of social order.

Conversely, *Yenidüzen* (August 8 and 13, 2025) questioned the surveillance system within the framework of democratic oversight and privacy through headlines such as "Artificial Intelligence: Arbitrary Decision," "Insufficient Infrastructure Risks Waste," and "Traffic Commission Bypassed." The emphasis on "arbitrary decision" highlighted the critique of technological neutrality and, through expert legal opinions, brought the issue of protection of personal data to the public agenda.

Similarly, *Kıbrıs Objektif* made public reactions visible by reporting on protests organized through social media. The headline "Protest Against AI Cameras!" transformed citizens' digital resistance into physical action, demonstrating how online reactions materialized in the public sphere. This situation exemplifies Habermas's (1989) theory of the public sphere, showing how digital platforms can transform into arenas of political deliberation.

At the macro level, this structure clearly reveals two opposing axes within media discourse: the state axis legitimizes surveillance through notions of security, order, and technological progress, whereas the citizen axis opposes it through discourses centered on privacy, accountability, and rights. This dual structure parallels Foucault's (1977) model of disciplinary power, indicating that surveillance operates not only as a top-down mechanism but is also socially reproduced through media representations (Fairclough & Wodak, 1997).

#### 4.1.2. Micro-Level Discursive Structure

The micro-level analysis focuses on the formal elements of language and the construction of discourse. At this level, word choices, emphasis patterns, repetitions, and linguistic strategies constitute the most visible areas of ideological positioning.

*Topuz* (August 13, 2025) and *Gıynık* (August 13, 2025) both shifted the focus of the debate to social media posts during the same period. In *Gıynık's* article titled "Citizens React to AI-Supported Cameras," the following statements were included: "A text that has been circulating on social media in recent days is being shared by many users. The text expresses that people do not consent to the recording of the inside of their vehicles by cameras. [...] 'I am ... from the residents of ... This is my official written declaration... I DO NOT GIVE MY CONSENT OR PERMISSION!...'"

  

The widespread circulation of this post demonstrates how an individual reaction in the digital sphere transformed into a collective discourse of legal resistance. Similarly, *Kıbrıs Postası* (August 12, 2025) reproduced the same text directly, noting that it had been "shared thousands of times" on social media.

Although written as an individual legal declaration, it carried a strong counter-power discourse. The repeated expressions ("for any purpose whatsoever"), the use of uppercase letters ("I DO NOT GIVE MY CONSENT OR PERMISSION"), and the inclusion of official legal terminology ("this is my legal statement," "my right to compensation") indicate that anger was transformed into a form of cognitive regulation. This structure reflects Foucault's (1977) concept of the micro-level reversal of power, where individuals construct their own legality and produce counter-discourse against surveillance. At the micro level, the opposing discourse was represented by state actors. Officials of the M

inistry of Transportation stated, "Those who oppose cameras are encouraging traffic monsters," reestablishing authority through a blaming tone. Similarly, the phrase "Roads are public, not private" redefined the distinction between public and private space, legitimizing surveillance. In this discourse, the state was positioned as a protective authority, while dissenting voices were labeled as "those who oppose order."

These examples demonstrate that the state constructs its discourse around the axes of security and civilization, while citizens construct theirs around privacy and rights. Facebook and online news platforms thus functioned as digital public spaces where negotiation and conflict between these two poles took place simultaneously.

**4.1.3. General Evaluation**

The debate surrounding AI-based traffic cameras in August 2025 created a multilayered arena of struggle between the state's discourse centered on security and order and the citizen's counter-discourse grounded in privacy. *Kıbrıs Postası* and *Gıynık* legitimized surveillance through the notions of modernization and civilization, whereas *Yenidüzen*, *Topuz*, and *Kıbrıs Objektif* developed a critical counter-discourse emphasizing individual rights, private life, and public accountability.

During this process, Facebook and similar digital platforms functioned as digital public spaces where negotiation and conflict between these two discursive poles occurred simultaneously. The statements of state actors were reproduced through news texts, while citizens generated counter-discourses through comments, posts, and calls for protest, thereby reconstituting power relations within discourse itself. As Van Dijk's (2001) model of ideological polarization suggests, the binary opposition of "us versus them" was reconstructed through media language. Foucault's notion of the micro-level reversal of power became visible in citizens' individual posts, particularly in the "No Consent" declarations that circulated widely across social media.

**5. Conclusions**

This study evaluated the social and discursive reactions that emerged in the Turkish Republic of Northern Cyprus (TRNC) during the implementation of AI-supported traffic cameras within a behavioral-cognitive theoretical framework. The main objective was to understand the perceptual, emotional, and cognitive reactions that surveillance technologies evoke in individuals, and how these reactions are transformed into collective social discourses through media and social media (Foucault, 1975; Bandura, 1977; Habermas, 1989; Van Dijk, 2001).

The behavioral-cognitive approach assumes that individuals are not passive recipients but active subjects who interpret environmental stimuli, make sense of them, and restructure their patterns of response accordingly (Bandura, 1986). Within this framework, reactions to AI cameras are not simply "technological fears" but cognitive processes shaped by reassessments of trust, privacy, authority, and personal space (Dökmen, 2009; Yılmaz & Bektaş, 2019b). The widespread statement "I do not give my consent or permission" represents an externalization of the individual's internalized sense of privacy.

  

This discourse signifies not a behavioral rejection but a cognitive effort to draw boundaries and construct a subjective domain of control (Foucault, 1977). From the perspective of surveillance theory, this process reproduces Foucault's "panopticon" model within a contemporary digital context (Foucault, 1975; Lyon, 2018). However, what is striking in the TRNC case is that these forms of surveillance are legitimized not only through state authority but also through a discourse of technological modernization (Yılmaz, 2025). While state actors redefine surveillance in terms of "civilization" and "order," citizens defend privacy within the framework of "rights" and "freedom." Thus, the tension between privacy and security was elevated from the individual level to a broader public debate (Habermas, 1989; Fairclough & Wodak, 1997).

This study demonstrates that discussions on surveillance technologies in the TRNC carry profound implications not only on legal or technical levels but also on the dimensions of identity, belonging, and governance (Castells, 2009; Hall, 1998). In a small-scale society where the boundaries between public visibility and private life are historically permeable, AI-supported cameras have made this permeability even more pronounced, linking individual behavior in public space directly to processes of cognitive self-regulation. While this has led to the internalization of surveillance, it has simultaneously produced new forms of resistance (Foucault, 1977; Bandura, 1986).

The findings reveal that in the TRNC context, surveillance and privacy are intertwined at cultural, political, and psychological levels. In the state's discourse, security becomes dominant, while in the citizen's discourse, freedom prevails; the media, in turn, serves as an intermediary platform between these two poles (Yılmaz & Bektaş, 2019b; İnal, 1996; Bayraktutan et al., 2012). This triadic structure (state, media, and citizen) shapes the cognitive map of the surveillance society.

Ultimately, this study shows how surveillance and privacy are conceptualized at both discursive and cognitive levels. From a behavioral-cognitive perspective, the individual does not perceive surveillance merely as an external mechanism of control but evaluates it within their own mental processes, producing reactions, consent, or resistance accordingly (Bandura, 1986; Dökmen, 2009). The TRNC case demonstrates that surveillance is not only a technological mechanism but also a cognitive experience that transforms social behavior patterns. In this respect, the research can be interpreted as an indicator of a new era in which the boundaries of privacy and the public sphere are being redefined in the digital age (Habermas, 1989; Foucault, 1977; Yılmaz, 2025).

**4.1. Theoretical Evaluation and Contribution**

This research combines the behavioral-cognitive approach with surveillance theory and public sphere discussions to present a new interpretation of the digital age (Habermas, 1989; Foucault, 1975; Bandura, 1986). In this framework, the individual is not merely the object of surveillance but an active subject who interprets environmental stimuli and produces patterns of reaction through cognitive processes.

Thus, the privacy discourse that emerges in social media can be interpreted as a practice of public subjectivity at the level of cognitive awareness (Fairclough, 1995; Wodak, 2007; Yılmaz & Bektaş, 2019b). This theoretical framework gains particular significance within the small-scale and highly visible social structure of the TRNC. Here, surveillance technologies are not only instruments of technical control but also cognitive and social experiences in which notions of security, modernization, and belonging are redefined (Castells, 2009; Yılmaz, 2025). The behavioral-cognitive principle that "the individual regulates behavior by interpreting environmental stimuli" has proven functional in explaining forms of consent or resistance to surveillance (Bandura, 1977; Dökmen, 2009).

In this sense, the study goes beyond classical critiques of surveillance by revealing the intersection between cognitive processes and public discourse (Van Dijk, 2006; Wodak, 2007; Hall, 1998). It demonstrates that privacy is not merely an individual right but also a determinant of collective cognition and social behavioral patterns (Ercan & Marsh, 2016). Ultimately, this research contributes to the literature on both surveillance and the public sphere

  

by introducing a cognitive-discursive analytical perspective that redefines state–citizen relations in the digital era (Habermas, 1989; Foucault, 1975; Bandura, 1986; Yılmaz, 2025).

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# QUALITY ASSURANCE IN HIGHER EDUCATION: INSIGHTS FROM AZERBAIJAN STATE PEDAGOGICAL UNIVERSITY

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**ABSTRACT**
The paper examines the conceptual bases, institutional practices, and strategic views on quality assurance (QA) in higher education, focusing on the case of Azerbaijan State Pedagogical University (ASPU). The study incorporates a descriptive-analytical methodology, combining literature review, policy document analysis, and evaluation of institutional practices, with particular attention to management frameworks, internal quality assurance systems, and stakeholder engagement.
The findings reveal that ASPU has developed QA mechanisms aligned with international standards (ESG), while adapting them to local needs through three complementary approaches: excellence-oriented management, transformative and adaptive educational services, and accountability-based monitoring. Results from surveys, rating assessments of academic staff, and accreditation reviews demonstrate progress in transparency, institutional reputation, and quality culture. However, challenges remain in achieving a shared institutional vision, overcoming reliance on traditional teaching methods, and inhibiting the formal implementation of quality assurance procedures.
The discussion emphasizes the dual function of QA as both a compliance tool and a driver of institutional development, highlighting the importance of reflexive analysis and integration of organizational values. ASPU's experience indicates that effective QA fosters internal cultural change, enhances trust among stakeholders, and strengthens the university's international visibility.
The paper concludes that sustainable quality culture in higher education requires continuous self-assessment, dynamic adaptation to societal changes, and collective participation of all stakeholders. Recommendations emphasize the need to improve methodological coherence among faculty and to establish quality assurance as a transformational institutional approach rather than merely a procedural tool.

**Keywords:** *Quality assurance, higher education, management, Azerbaijan, ASPU*

## Introduction

Higher education systems worldwide are undergoing rapid transformation driven by digitalization, evolving socio-economic needs, and rising expectations for institutional accountability, transparency, and quality. For countries building knowledge-based economies – such as Azerbaijan – quality assurance (QA) has become a core mechanism for strengthening higher education governance and supporting national development priorities. Within this context, universities are gradually transitioning from traditional teaching-oriented structures to dynamic, innovation-driven institutions capable of embedding digital technologies, evidence-based decision-making, and continuous quality enhancement into their organizational culture.

Azerbaijan State Pedagogical University (ASPU), as one of the country's leading teacher education institutions, has been at the forefront of implementing internal quality assurance systems aligned with both national policy reforms and emerging global standards. Theoretical and empirical literature highlights that the effectiveness of QA in higher education depends on its integration into strategic management cycles, its capacity to guide evidence-informed decision-making, and its ability to foster institutional learning and improvement. Research also shows that universities with well-developed QA systems tend to achieve higher levels of performance, innovation capacity, and alignment with societal needs.

Thus, the study is positioned within the broader discourse on quality assurance, strategic governance, and organizational transformation in higher education. It argues that QA is not merely a mechanism for compliance

  

but a strategic tool that influences institutional development, contributes to human capital formation, and ultimately shapes macro-level socio-economic progress. Through an in-depth analysis of ASPU's experience, the study investigates how QA practices can strengthen institutional effectiveness and support national educational modernization goals.

**Aim**

The aim of this research is to analyze the internal quality assurance practices of Azerbaijan State Pedagogical University and examine how these mechanisms enhance institutional performance, support evidence-based management, and contribute to broader national education objectives. Specifically, the study focuses on:

- Assessing the structure, processes, and effectiveness of ASPU's internal QA system;
- Exploring how QA practices inform strategic planning, decision-making, and continuous improvement across the university;
- Identifing institutional and policy-related conditions that enable QA to drive organizational development and align university outcomes with national priorities.

By doing so, the study aims to develop a conceptual and practical understanding of how internal QA can function as a strategic instrument for institutional transformation.

**Theoretical Framework**

The theoretical framework of this study is built upon four complementary perspectives – New Public Management (NPM), Human Capital Theory, Institutional Theory, and Innovation Systems Theory – which together provide a multidimensional conceptual structure for understanding quality assurance (QA) in higher education and its institutional and societal implications. These theories collectively explain how internal QA mechanisms at Azerbaijan State Pedagogical University (ASPU) influence organizational behavior, strategic decision-making, and broader educational and economic outcomes.

Above-mentioned theories create a comprehensive conceptual map for the study. NPM explains governance and performance mechanisms; Human Capital Theory situates QA within national development; Institutional Theory clarifies organizational adaptation to external pressures; and Innovation Systems Theory highlights the role of QA in fostering innovation. The integrated framework thus allows the research to examine how ASPU's internal QA practices operate at the intersection of institutional governance, human capital enhancement, organizational legitimacy, and innovation-driven development. This theoretical configuration guides the analysis of variables – including QA processes, institutional performance, strategic governance practices, and socio-economic outcomes – and provides a structured foundation for interpreting the empirical findings of the study.

**Literature Review**

The literature on quality assurance (QA) in higher education generally conceptualizes the notion of "quality" through three dominant perspectives. First, several scholars define quality as a management approach oriented toward excellence, where universities seek to align their teaching, research, governance, and internationalization processes with globally or regionally recognized standards such as the ESG (Harvey, 2024). Second, quality is described as a transformative and adaptive service approach in general management, emphasizing the need for institutions to respond to dynamic social, economic, technological, and cultural changes through context-specific strategies (Galkute, 2014). Third, quality is examined as a mechanism of control and accountability, positioning QA as a core component of political evaluation and strategic decision-making processes (Westerheijden, 2014).

At Azerbaijan State Pedagogical University (ASPU), QA practices reflect all three conceptual traditions. According to the University's QA Department Regulations, institutional functions are organized around (1) activities aimed at improving academic staff and student preparedness (excellence-oriented management), (2) participation in national and international projects and the adaptation of external institutional experiences (transformative and adaptive service approach), and (3) systematic monitoring, performance evaluation, and rating-based assessment of academic and administrative units (accountability mechanism). These dimensions together constitute the university's strategic pillars for quality enhancement.

  

The literature further indicates that effective QA implementation requires the identification of clear objects of evaluation (what is assessed?), standards (who defines them and how?), content (which features are evaluated?), and values (guiding principles) (Quality and Qualifications Ireland, 2023). ASPU's QA Policy reflects this framework by defining QA as the system of policies, procedures, and practices ensuring alignment with academic, research, and community service goals. Continuous changes in stakeholder needs necessitate regular review, evaluation, and updating of monitoring tools, self-assessment procedures, and improvement plans.

Empirical studies categorize QA practices into four broad domains: (1) institutional and policy frameworks regulated through normative standards, (2) service-centered approaches that promote student-centered learning, (3) accreditation mechanisms aligned with national and international standards, and (4) dynamic management frameworks that integrate complementary processes and stakeholder participation (Pramono, 2024). Consistent with broader findings, Carvalho (2023) and Zhang (2022) argue that QA is both an institutional responsibility and a professional mandate that safeguards minimum standards in educational services and capacity building. In ASPU's context, this dual perspective is reflected in the application of both internal QA (stakeholder-led monitoring and evaluation) and external QA (accreditation, state agencies, and international partners).

Harvey (2023) highlights that QA contributes to institutional improvement primarily by cultivating a culture of reflexive analysis, enabling universities to confirm achievements, identify areas for improvement, and justify strategic priorities. This aligns with ASPU's recent initiatives, including the development of its QA Policy, the adoption of the ESG standards, preparation of internal QA guidelines, and establishment of multiple QA structures—Quality Commission, Monitoring Commission, and university-wide working groups. Furthermore, ASPU's engagement in national and international projects, including the IQAinAR initiative, and its extensive reporting practices (e.g., annual rating evaluation of staff and departments) have strengthened both quality culture and reflective practices.

Research on contemporary higher education emphasizes that modern universities operate simultaneously as pedagogical institutions, competitive service providers, strategic decision-makers, and innovation-driven organizations. QA contributes to these expanded roles by reinforcing transparency, strengthening institutional reputation, and facilitating network-based collaboration among universities (Oktarina, 2024). ASPU's recent experience demonstrates similar gains: transparent rating evaluations, stakeholder surveys, and the public dissemination of assessment reports have improved institutional accountability. Large-scale student surveys – for instance, participation of 5,137 students in the 2024/2025 academic year QA survey – signal enhanced trust and institutional visibility.

The literature also underscores the importance of stakeholder engagement in QA processes. According to Kayyali (2023), effective QA relies on the active involvement of academic staff, students, administrative personnel, and employers, as broad participation strengthens strategic goal attainment and collective ownership. Limited participation, on the other hand, reduces individual responsibility and undermines institutional improvement. Reflecting these insights, ASPU has expanded stakeholder roles across multiple QA activities, including working groups, commissions, surveys, rating evaluations, and curriculum reform efforts. Additionally, initiatives such as integrating global best practices into master's thesis topics and updating course content based on leading country models further illustrate strong stakeholder engagement.

Although QA brings significant advantages, the literature also identifies ongoing challenges. Oktarina (2024) notes obstacles such as incomplete staff awareness of shared goals, the risk of QA processes becoming formalistic, and the scarcity of qualified QA professionals. ASPU's 2025 student survey results reflect similar concerns, which are signals of partial misalignment between staff perceptions and quality expectations. Addressing these challenges requires a unified institutional vision and stronger methodological coherence across academic units, along with a shift from procedural compliance to meaningful, improvement-oriented QA practices.

The literature further emphasizes the dynamic nature of QA. According to Quality and Qualifications Ireland (2023), QA systems should not be static; rather, they must evolve in response to societal, technological, and

  

economic conditions. This perspective supports ASPU's ongoing efforts to continuously update strategic plans, quality targets, and managerial mechanisms.

An emerging theme in the literature is the integration of organizational values with quality culture. Vettori's "quality engineering model" suggests that internal processes and structures must be organized to promote effective governance and sustainable development, not merely accreditation compliance (Harvey, 2024). This conceptualization is mirrored in ASPU's experience, where quality culture contributes to collective understanding of improvement needs and fosters alignment between institutional values and quality imperatives. International evidence, particularly from Finland, illustrates that transparency, progressive learning environments, entrepreneurial attitudes, and social integration reinforce strong quality cultures (Harvey, 2024). These findings imply that long-term success depends on embedding quality deeply within institutional identity and strategic direction.

*Literature gap and contribution of this study:* Although the global literature extensively discusses QA frameworks, stakeholder participation, and institutional culture, there is a limited body of research examining QA implementation in teacher-training universities within emerging economies, particularly in the context of digital transformation and innovation ecosystems. Existing studies seldom analyze QA as a multidimensional mechanism that simultaneously influences governance, learning outcomes, institutional culture, and university-industry collaboration.

This study contributes to the literature by providing an integrated examination of QA practices at ASPU through the combined lenses of New Public Management, Human Capital Theory, Institutional Theory, and Innovation Systems Theory. By linking QA processes to strategic governance, human capital development, organizational adaptation, and innovation capacity, the study offers a holistic conceptualization of QA that expands existing theoretical and empirical discussions, especially within the regional context of Azerbaijan.

## Methodology

### Research Model

This study adopts a qualitative descriptive research design, employing an institutional case study approach combined with document analysis. The research model is designed to examine internal quality assurance (IQA) practices and strategic development processes at Azerbaijan State Pedagogical University (ASPU). The focus is on understanding how QA mechanisms, strategic planning instruments, and organizational practices contribute to institutional performance and align with contemporary quality assurance theories.

The qualitative case study approach enables an in-depth examination of QA as a multidimensional institutional process, allowing the study to capture interactions between governance structures, resource capacity, operational processes, and performance outcomes. Document analysis provides a systematic means of examining formal policies, evaluations, and performance indicators within internationally recognized QA frameworks.

### Sampling Method

The study examines the institutional environment of ASPU, a teacher-training university in Azerbaijan that is in the process of developing and strengthening its internal quality assurance system. The research sample consists of official institutional documents and datasets produced between 2021 and 2025, selected through purposeful sampling based on their relevance to QA implementation and strategic development.

Key data sources include:

- The 2023 Accreditation Report of the Education Quality Assurance Agency of Azerbaijan (TKTA), evaluating institutional resources, academic staff capacity, and QA governance mechanisms;
- The University's 2030 Strategic Development Plan and internal QA policy documents;
- Institutional performance indicators, including ASPU's results in the THE Impact Rankings 2025 and the UI GreenMetric World University Rankings 2025;
- Internal evaluation instruments, such as the 106-criterion academic staff rating system;

  

- Large-scale stakeholder surveys conducted in 2025, covering 5,137 students as well as academic and administrative personnel.

Together, these sources provide a comprehensive dataset for assessing ASPU's internal QA practices and institutional development.

**Collection of Data**

Data collection was conducted between January and October 2025 using a systematic document analysis procedure, complemented by a secondary review of relevant scholarly literature. Accreditation reports were used to assess institutional resource capacity, structural organization, and governance mechanisms supporting teaching, research, and administrative processes. Strategic plans and policy documents provided insight into developmental priorities and future-oriented initiatives.

Internal QA instruments – such as self-assessment reports, rating evaluations, and stakeholder surveys – offered evidence on the implementation and monitoring of QA processes. International ranking data served as outcome-based indicators for evaluating institutional effectiveness and external recognition. Scholarly literature informed the conceptual framework and supported the interpretation of institutional QA practices.

All documents were identified, compiled, and categorized according to a resource–process–outcome framework. To ensure reliability and authenticity, all materials were cross-checked against official institutional releases. Ethical considerations were strictly observed; the study relied exclusively on publicly accessible and anonymized institutional data, and no personal or sensitive information was collected.

**Analysis Method**

Data analysis followed a qualitative content analysis approach supported by thematic coding. Deductive codes were derived from established QA literature, including critiques of compliance-oriented QA systems (Harvey, 2023), integrated resource–process–outcome models (Oktarina, 2024), and IPA-based (Importance-Performance Analysis) institutional improvement frameworks (Dwaikat, 2020).

Institutional data were systematically mapped against these conceptual categories to examine how resource availability, organizational structures, and strategic planning practices support QA implementation at ASPU. Triangulation across multiple data sources – accreditation reports, policy documents, internal evaluations, ranking results, and stakeholder surveys – was employed to enhance analytical reliability and reduce interpretive bias.

Finally, findings were interpreted through the lenses of New Public Management, Human Capital Theory, Institutional Theory, and Innovation Systems Theory, enabling an integrated understanding of how ASPU's internal QA system functions as a mechanism for strategic governance, institutional development, and socio-economic contribution.

**Findings / Results**

This section presents the findings obtained from the qualitative analysis of accreditation reports, institutional policy documents, internal evaluation instruments, strategic plans, and stakeholder survey data related to internal quality assurance (QA) practices at Azerbaijan State Pedagogical University (ASPU). The findings are organized according to the resource-process-outcome framework. The main findings are summarized in Table 1.

  

**Table 1. Main Findings on Internal Quality Assurance Practices at ASPU**

| Dimension | Indicator | Data Source | Findings |
|---|---|---|---|
| **Resources** | Institutional structure | TKTA Accreditation Report (2023) | Existence of formally established academic and administrative units responsible for QA and governance |
| | Academic staff capacity | Accreditation Report; Internal records | Presence of qualified academic staff and specialized research units supporting teaching and research |
| | Digital infrastructure | Strategic Plan 2030; Internal QA documents | Developing electronic management systems supporting academic and administrative coordination |
| **Processes** | Stakeholder surveys | Internal QA reports (2025) | Annual surveys conducted among students, academic staff, and administrative personnel |
| | Student participation | QA Survey Data (2025) | Participation of 5,137 students in institutional quality surveys |
| | Performance evaluation | Internal QA mechanisms | Implementation of a 106-criterion academic staff rating system and regular self-assessment procedures |
| **Outcomes** | External evaluation results | THE Impact Rankings (2025) | Institutional placement reflecting assessed performance in sustainability and social impact |
| | Environmental performance | UI GreenMetric Ranking (2025) | Evaluated outcomes related to energy efficiency, environmental management, and green campus initiatives |
| | Internal monitoring outputs | Institutional evaluation reports | Annual evaluation reports produced for academic units and staff performance |

As presented in Table 1, the findings indicate that internal quality assurance at ASPU is structured around three interrelated dimensions: institutional resources, QA processes, and performance outcomes. Accreditation documentation confirms the presence of organizational structures, qualified human resources, and developing digital infrastructure that support QA-related activities across academic and administrative domains.

Process-related findings show that ASPU has implemented systematic internal QA mechanisms, including stakeholder surveys, self-evaluation reports, and performance monitoring tools. The participation of 5,137 students in the 2025 institutional surveys demonstrates large-scale engagement in QA activities. In addition, the application of a 106-criterion rating system provides structured input for monitoring academic staff performance and institutional processes.

Outcome-related findings are reflected in both internal and external evaluation results. External rankings, such as the THE Impact Rankings 2025 and the UI GreenMetric World University Rankings 2025, provide documented performance indicators in areas related to sustainability, environmental management, and institutional development. Internal evaluation reports further generate regular monitoring outputs used for institutional review and reporting purposes.

Overall, the findings demonstrate that ASPU's internal quality assurance system is operationalized through documented institutional capacities, systematically applied QA processes, and measurable outcome indicators. These results establish an empirical basis for examining the role of QA in institutional governance and development, which is further addressed in the Discussion section.

  

**Discussion**

The findings confirm that quality assurance in higher education extends beyond technical compliance and functions as a strategic mechanism for institutional governance and development. Consistent with contemporary QA literature, ASPU's experience illustrates that effective QA depends on the integration of stakeholder participation, data-informed monitoring, and alignment with institutional strategy.

The strong resource base identified through accreditation outcomes supports previous research emphasizing the importance of institutional capacity in QA effectiveness. Adequate staffing, structured governance units, and digital infrastructure enable universities to move beyond fragmented quality initiatives toward system-wide implementation. In ASPU's case, these resources create favorable conditions for embedding QA into daily academic and administrative practices.

The process dimension highlights the transformative role of internal QA mechanisms. Regular surveys, self-assessment procedures, and performance evaluations foster a culture of quality by engaging academic staff, students, and administrators in reflective practices. The application of the IPA-based Total Quality Management approach demonstrates that identifying weaker performance areas and prioritizing targeted interventions enhances overall institutional effectiveness. This supports existing critiques of purely compliance-oriented QA and reinforces the value of adaptive, improvement-focused models.

The outcome indicators, particularly international rankings, serve as external validation of internal QA efforts. While rankings are not comprehensive measures of quality, they provide useful signals of institutional progress, visibility, and alignment with global sustainability and development agendas. ASPU's improved ranking positions suggest that internally driven QA practices can translate into externally recognized performance gains.

Taken together, these findings align with theoretical perspectives such as New Public Management, Institutional Theory, Human Capital Theory, and Innovation Systems Theory. QA at ASPU operates at the intersection of accountability, organizational legitimacy, human capital development, and innovation, demonstrating how internal QA can simultaneously satisfy regulatory requirements and support strategic institutional transformation.

**Conclusion**

This study demonstrates that internal quality assurance at Azerbaijan State Pedagogical University functions as a strategic instrument rather than a purely procedural or bureaucratic mechanism. Through the integration of resource capacity, process coordination, and outcome evaluation, QA contributes to institutional effectiveness, accountability, and continuous improvement.

The analysis shows that ASPU's internal QA system supports evidence-based management, strengthens stakeholder engagement, and aligns institutional practices with national education priorities and international standards. Accreditation outcomes confirm the availability of institutional resources, while internal monitoring tools and surveys enable systematic evaluation and adaptive decision-making. Improvements in international ranking performance further indicate that sustained QA efforts can enhance institutional visibility and development outcomes.

Importantly, the findings underscore that meaningful QA requires a shift from compliance-driven practices toward improvement-oriented and strategically embedded approaches. When aligned with organizational values, digital transformation agendas, and stakeholder expectations, QA becomes a driver of innovation, institutional learning, and sustainable development.

In conclusion, the ASPU case illustrates how internal quality assurance can serve as a multidimensional mechanism that strengthens governance, enhances human capital development, and supports broader socio-economic objectives. These insights are particularly relevant for teacher-training universities and higher education institutions in emerging economies seeking to modernize their systems and build resilient, quality-oriented academic environments.

  

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# QUALITY MANAGEMENT AND QUALITY ASSURANCE IN HIGHER EDUCATION

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**ABSTRACT**
This article highlights the importance of quality management and quality assurance in higher education. As global expectations regarding accountability and performance in education rise, universities are pursuing much more systematic strategies to enhance institutional quality. The article addresses both internal and external quality assurance mechanisms, including accreditation, strategic planning, and continuous improvement practices. It also examines the role of international standards, such as European Standards and Directives, in aligning institutions with global norms. Stakeholder engagement, particularly student involvement, is highlighted as a critical component of quality improvement. Ultimately, quality assurance is depicted not merely as compliance with standards, but as a highly dynamic, ongoing effort toward institutional excellence and innovation in education.

**Keywords:** Higher Education, Quality Assurance, Quality Management, Accreditation, Strategic Planning

## INTRODUCTION

Higher education institutions are facing globalized education systems, ever-increasing student demand, and constantly changing societal expectations. In this context, quality management and quality assurance processes are of great importance for the sustainable success of educational institutions, as well as for establishing transparent accountability mechanisms (Iyer, 2018). Quality assurance consists of a set of systematic processes that ensure that the education offered by higher education institutions is in compliance with predetermined standards and is improved over time (Suleiman, 2023).

This process serves fundamental goals such as student-centered education delivery, ensuring institutional reputation, and demonstrating integrity with international standards (Tinapay et al., 2024). The quality assurance process consists of two main components: internal and external quality assurance. Internal quality assurance comprises evaluation and improvement activities carried out within each institution. Lifelong learning assessment, student feedback systems, and instructional improvement programs are particularly important in this context. On the other hand, external quality assurance is carried out through analyses conducted by independent accreditation bodies and significantly strengthens institutional accountability (Hanft, 2020).

Equivalency measures the compliance of higher education institutions and programs with specific standards and provides documentation of this compliance (Gaston, 2023; Russell, 2023). This process increases the international recognition of institutions while simultaneously demonstrating the reliability of national quality systems. It also facilitates a more active involvement of students in their educational processes, supporting their participation as stakeholders in quality processes ( Hahn, 2004).

### International Standards and International Policies

The concept of quality is not limited to academic outputs but also encompasses education, research, administrative processes, and stakeholder relations. Quality management in higher education is based on strategic planning, internal and external evaluation, total quality management, and accountability. In this context, quality assurance enables institutions to systematically measure, evaluate, and improve their performanc (Aithal and Maiya, 2023).

### Fundamental Dimensions of Quality Management

Quality management in higher education begins with defining institutional goals and planning the necessary processes to achieve them. In this process, institutions design strategic plans that meet student needs, business expectations, and international quality standards. Within the framework of strategic planning, multiple indicators

  

are determined, such as curriculum development and improvement, teaching staff characteristics and qualifications, and methods for analyzing learning outcomes (Grillitsch and Felscher, 2024).

Quality assurance practices in the global higher education sector encompass numerous policies and standards that vary across regions but all serve a common purpose ( Fernandes and Singh, 2022; Duarte and Vardasca, 2023). The European Quality Assurance Standards and Guiding Principles, approved by the European Higher Education Area, aim to make the quality assurance processes of institutions internationally recognizable (Alesi and Kehm, 2010; Janssens et al., 2022). These standards aim to establish systematic quality assessment processes and promote continuous improvement in higher education institutions (Braun et al., 2023; Okpala and Korzeniowska, 2023).

Current literature indicates that quality assurance systems should not be limited to traditional compliance-focused structures, but should be rebuilt to meet the needs of the next generation, such as digital transformation and technological adaptation. In the Society 5.0 era, quality management is seen not merely as a control mechanism, but as an approach that supports the strategic development of organizations and includes the views and contributions of all stakeholders (Troisi et al., 2024).

In conclusion, quality assurance in higher education is not merely about compliance with standards, but also a dynamic, inclusive, and strategic effort to enhance institutional credibility, encourage continuous improvement, and ensure that educational outcomes are better aligned with societal and global expectations.

## Discussion and Conclusion

Quality management and quality assurance in higher education play a significant role in ensuring the effectiveness, efficiency, and sustainability of education systems (Bakhmat, et al., 2022; Javed and Alenezi, 2023). Quality assurance systems enable higher education institutions to systematically evaluate their educational processes, providing education that is highly responsive to student needs, accountable, and compliant with international standards (Knispel, 2008; Kaufmann, 2009; Sheperd, 2025).

The coordinated implementation of internal and external evaluation mechanisms strengthens the internal dynamics of institutions while increasing their credibility with external stakeholders (Bauer, 2003; Mello and Vargas, 2022; Multrus, 2013).

Furthermore, the effective implementation of quality assurance mechanisms requires the active participation of stakeholders such as students, educators, faculty, the business community, and other individuals in society (Bohlens, 2025; Leal Filho et al., 2025; Leisyte and Westerheijden, 2014). Including students in all these quality processes significantly contributes to improving educational outcomes and promotes the continuous development of the education system (Tariq, 2025).

Research on quality management and quality assurance in higher education, particularly conducted internationally in recent years, shows that this field is not merely a technical process (Al-Zoubi et al., 2023). This also includes important dimensions such as institutional culture, management strategy, and stakeholder participation. Quality assurance approaches are seen as indispensable tools for improving the performance of institutions in the international competitive environment and for measuring the effectiveness of education systems (Dugarova et al., 2016; Fend, 2014).

In this context, quality assurance is considered not only a process of complying with standards, but also a continuous strategic effort by organizations to improve themselves and achieve excellence. By adopting quality assurance, organizations both improve the student experience and ensure that educational outcomes are more aligned with societal needs (Joshua, 2025).

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# TURNING NUMBERS INTO QUALITY: A LEARNING ANALYTICS-BASED ACADEMIC STAFF EVALUATION MODEL IN HIGHER EDUCATION

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**ABSTRACT**
The purpose of this study is to examine the longitudinal stability, structural coherence, and predictive capacity of a learning analytics-based academic staff evaluation model in higher education. Specifically, the study investigates the relationships between student feedback, composite academic staff rating scores, and demographic performance indicators within a digitally institutionalised quality assurance system.
This research adopts a quantitative, correlational, and longitudinal design. The dataset comprises institutional performance records for 565 faculty members, collected over seven years (2018–2024). Data were obtained from the digital academic staff rating system, online student feedback platform, learning management system analytics, and research and institutional service databases. Statistical analyses included descriptive statistics, longitudinal trend analysis, Pearson correlation, regression modelling, inter-year correlation heatmap analysis, and group-based comparisons across gender and age categories.
The findings reveal a consistent upward trend in academic staff performance over time, indicating continuous professional development under digital performance monitoring. A strong, positive, and statistically significant relationship was identified between student feedback scores and composite academic staff ratings, confirming that feedback is a key predictor of academic performance. Female faculty members demonstrate slightly higher average performance, whereas the 30–39 age group exhibits the strongest performance dynamics. Inter-year correlation results show that the evaluation system achieved high institutional stability and predictive reliability after 2021.

**Keywords:** *learning analytics, academic staff evaluation, digital quality assurance, student feedback, higher education*

## Introduction

The rapid digital transformation of higher education has fundamentally reshaped institutional governance, teaching–learning processes, and quality assurance mechanisms. Universities are increasingly operating as data-driven organisations in which digital technologies and learning analytics support decision-making, performance monitoring, and academic development. In this context, academic staff evaluation has evolved from traditional episodic assessment practices to continuous, technology-supported, multi-criteria performance monitoring systems.

In the contemporary higher education landscape, academic staff performance is no longer evaluated solely on the basis of classroom observation or isolated research outputs. Instead, integrated digital evaluation models combine teaching quality, student feedback, research productivity, and institutional service within unified performance architectures. Learning analytics, online student evaluation systems, and institutional performance dashboards enable universities to monitor academic quality in real time and to implement evidence-based quality assurance strategies (Daniel, 2015; Siemens & Gasevic, 2012).

The academic relevance and timeliness of academic staff evaluation are directly connected to global developments in digital governance, accountability, and outcome-based education. International accreditation frameworks and quality standards increasingly require transparent, data-based performance monitoring of academic staff. As a result, digital academic staff evaluation systems have become central operational components of internal quality assurance infrastructures.

The current state of the literature demonstrates significant growth in studies focusing on digital assessment, student feedback, learning analytics, and data-driven decision-making in higher education (Spooren et al., 2013; Viberg et al., 2018). However, most existing studies examine these components separately and within short-term or cross-sectional research designs. There remains a limited number of large-scale longitudinal empirical studies that validate the long-

  

term structural stability, predictive reliability, and developmental function of integrated academic staff evaluation systems.

Against this background, this study emerges from the institutional need to evaluate the effectiveness, stability, and predictive capacity of a learning analytics-based academic staff evaluation model implemented at a teacher education university. The motivation for this research is the need to move beyond descriptive digital monitoring toward empirically validated, development-oriented performance intelligence systems that support sustainable academic quality.

**Aim**

The main aim of this study is to examine the longitudinal stability, structural coherence, and predictive capacity of a learning analytics-based academic staff evaluation model in higher education. Specifically, the study aims to analyse the relationships between student feedback, composite academic staff rating scores, and demographic performance indicators (gender and age) within a digitally institutionalised quality assurance system. In addition, the study seeks to determine whether student feedback is a significant predictor of academic staff performance within a multi-criteria digital evaluation framework.

**Significance**

The significance of this study lies in its empirical contribution to educational technology, learning analytics, and higher education quality assurance. By providing a large-scale longitudinal validation of a digitally supported academic staff evaluation system, the study offers original evidence on how integrated performance monitoring models evolve into stable institutional governance mechanisms.

From a theoretical perspective, the study strengthens the conceptual link between learning analytics and academic staff evaluation by demonstrating that student feedback functions as a structural predictor of academic performance rather than merely as a perceptual indicator. From a practical perspective, the findings offer direct implications for the design of digital performance dashboards, professional development systems, and data-driven quality assurance frameworks. At the policy level, the study provides evidence-based guidance for institutions seeking to institutionalise transparent, predictive, and development-oriented digital evaluation systems.

**Theoretical Framework**

This study is grounded in three interrelated theoretical foundations: learning analytics theory, digital quality assurance models, and data-driven academic governance. Learning analytics provides the scientific framework for the measurement, analysis, and interpretation of educational data generated through digital environments (Siemens & Gasevic, 2012). It enables the transformation of raw instructional and feedback data into actionable performance intelligence.

Digital quality assurance theory emphasises the integration of continuous digital monitoring, performance indicators, and feedback loops into institutional improvement cycles. Within this framework, academic staff evaluation functions not as a static control mechanism but as a dynamic developmental mechanism that supports professional growth and pedagogical innovation.

Data-driven academic governance constitutes the third theoretical foundation of the study. It refers to the systematic use of empirical data for academic decision-making, strategic planning, and quality management (Daniel, 2015). Within this context, academic staff performance indicators, student feedback, and research productivity metrics are integrated into unified digital governance architectures that enable predictive and evidence-based institutional leadership.

**Literature Review**

Previous research has extensively examined student evaluations of teaching as one of the most widely used indicators of instructional quality in higher education. Meta-analytic studies confirm that student feedback is significantly associated with teaching effectiveness, course organisation, and learning climate (Spooren et al., 2013; Spooren et al., 2008). However, concerns regarding subjectivity and contextual bias remain central to ongoing academic debates.

Learning analytics research has demonstrated strong potential for supporting decision-making, performance prediction, and instructional improvement through real-time data analysis (Viberg et al., 2018; Ifenthaler & Yau,

  

2020). While most learning analytics studies remain student-centred, recent developments highlight the growing use of analytics to monitor academic staff performance.

Several major research strands have shaped the conceptual foundations of learning analytics. Gašević et al. (2015) emphasise that learning analytics should not be reduced to a set of technical indicators; rather, its core purpose is to generate deeper insights into learning processes themselves. From a broader perspective, Ferguson (2012) provides a systematic classification of the field's origins, developmental trajectories, and emerging challenges.

Meta-analytic examinations of citation networks further reveal how the field's intellectual structure has evolved, with Dawson et al. (2014) demonstrating the consolidation of learning analytics as a coherent research domain. In parallel, recent scholarship highlights the growing role of artificial intelligence in enhancing analytical models, with Tariq (2025) showing that AI-supported approaches can significantly improve the accuracy of predicting student performance. Furthermore, Ifenthaler et al. (2019) provide a comprehensive analysis of how learning analytics can be strategically leveraged to support student success across diverse educational contexts.

The practical applications of learning analytics rely heavily on LMS log data, student behavioural traces, and predictive modelling. The landmark "Course Signals" study conducted at Purdue University (Arnold & Pistilli, 2012) demonstrates that early-warning systems can substantially improve student success. Similarly, Macfadyen and Dawson (2010) show that LMS-generated behavioural indicators can be transformed into actionable insights to support real-time instructional decision-making.

Studies focused on predictive performance modelling provide additional evidence for the analytical power of learning analytics frameworks. Using LMS data, You (2016) identifies key behavioural indicators that reliably predict course achievement. Mythili and Shanavas (2014) complement this work by comparing the performance of multiple classification algorithms in predicting student outcomes. More recent analytics approaches—such as those proposed by Jiang et al. (2021)—demonstrate that fine-grained process data can be used to infer complex problem-solving strategies in large-scale assessments.

Beyond predictive analytics, research in digital learning design highlights how instructional structures shape learner engagement and academic outcomes. A large-scale cross-institutional study by Rienties and Toetenel (2016) shows that learning design is a strong determinant of student behaviour, satisfaction, and performance. Evidence from blended learning environments also confirms high levels of student satisfaction (Freij, 2022). Additionally, research on flipped classroom models demonstrates significant improvements in motivation and perceived learning quality (Sergis et al., 2017). In a complementary line of inquiry, Henderson et al. (2017) explore how students conceptualise "useful" digital technologies, revealing notable links between perceived usefulness and learning outcomes.

The effectiveness of learning analytics systems is also shaped by users' trust in algorithmic mechanisms. Kizilcec (2016) finds that the level of transparency embedded in algorithmic interfaces significantly influences trust and decision-making behaviours, highlighting the importance of ethical and psychological considerations in system design.

Finally, broader literature on student success provides essential context for understanding performance dynamics. A foundational review by Kuh et al. (2006) identifies the institutional, pedagogical, and behavioural conditions that most strongly influence student achievement. In parallel, Hallinger et al. (2014) show that systematic teacher evaluation plays a critical role in school improvement, reinforcing the importance of robust performance measurement systems in educational environments.

Data-driven decision-making in education has been shown to enhance institutional transparency, accountability, and strategic coherence (Schildkamp et al., 2013). However, existing studies predominantly rely on short-term datasets and fragmented performance indicators. The literature reveals a clear gap in longitudinal, institution-wide validation of integrated academic staff evaluation systems that combine learning analytics, student feedback, and digital quality assurance mechanisms within a unified framework.

Sharifov (2022) demonstrates that multi-dimensional staff rating and performance evaluation mechanisms exert a substantial influence on university faculty members' professional behaviour, research productivity, and pedagogical effectiveness. Complementing this perspective, Sharifov and Mammadzade (2022) argue that integrative institutional

  

evaluation systems play an increasingly critical role in enhancing governance efficiency, strengthening accountability, and fostering a sustainable culture of quality in higher education.

By addressing this gap, the present study contributes a rare large-scale longitudinal empirical analysis of a learning analytics-based academic staff evaluation model. It advances the understanding of digital performance governance in higher education.

**Methodology**

This section describes the research procedures in detail and in a reproducible manner. The methodological framework, sample characteristics, data collection instruments, application process, and statistical analysis techniques are systematically presented.

This study adopted a quantitative, correlational, and longitudinal research design. Since the primary aim of the research was to statistically examine the relationships between student feedback, academic staff performance indicators, and demographic variables over time, a longitudinal design was selected. The study is grounded in the learning analytics and data-driven governance paradigms.

The research design includes:

- Longitudinal analysis of academic performance dynamics across the years 2018–2024,
- Examination of correlations between student satisfaction and academic rating scores,
- Analysis of the effects of age and gender variables on academic staff performance.

The study sample comprises 565 academic staff members, evaluated over seven years (2018–2024). The participants were classified according to the following characteristics:

- Gender: male and female,
- Age groups: <30, 30–39, 40–49, 50–59, 60+,
- Academic positions: lecturer, senior lecturer, associate professor, professor, department head, vice dean, and dean.

The sampling strategy was based on a complete institutional census, meaning that all active academic staff members within the specified period were included in the study rather than a selected subsample.

Data were obtained from four primary digital sources:

1. *Institutional academic rating system*. This system provided annual composite performance scores based on teaching, research, and social/service activities.
2. Online student feedback survey system. Student evaluations of teaching quality were collected via standardised digital surveys and reported as percentage-based satisfaction scores.
3. *Learning management system (LMS) analytics module.* Instructional engagement indicators such as online participation, assignment completion, and assessment records were extracted from LMS logs.
4. *Research and institutional activity database.* Data on scientific publications, research projects, conference participation, and administrative responsibilities were retrieved from internal institutional records.

The data collection process was conducted in the following stages:

- Official institutional permission was obtained prior to data access,
- All datasets were processed in a fully anonymised format,
- Student feedback data were analysed using coded instructor identifiers only,
- All procedures strictly complied with ethical research standards,
- Collected data were used exclusively for scientific research purposes.

Statistical analyses were conducted using SPSS. The following techniques were applied:

- Descriptive statistics: mean, median, standard deviation,
- Longitudinal trend analysis**:** performance dynamics from 2018 to 2024,
- Pearson correlation analysis: relationship between student feedback and academic rating scores,
- Regression modelling: predictive role of student feedback,
- Heatmap-based inter-year correlation analysis: institutional system stability,
- Distributional analysis: outlier detection and right-skewness evaluation.

  

All analytical results were visualised using histograms, scatter plots, box plots, and correlation heatmaps to enhance interpretability.

**Findings and discussion**

This section presents the empirical findings obtained from the analysis of the institutional academic staff evaluation dataset covering the years 2018–2024. The findings are objectively reported and supported by visualisations from the PowerPoint presentation. Subsequently, the results are interpreted and discussed in relation to the existing literature on learning analytics, student feedback, and digital quality assurance in higher education.

The longitudinal development of academic staff performance scores shows a clear, systematic upward trend from 2018 to 2024. As illustrated in Fig. 1, the average faculty rating steadily increases across the observed period, reflecting continuous improvement in teaching quality, student engagement, and institutional quality assurance mechanisms.

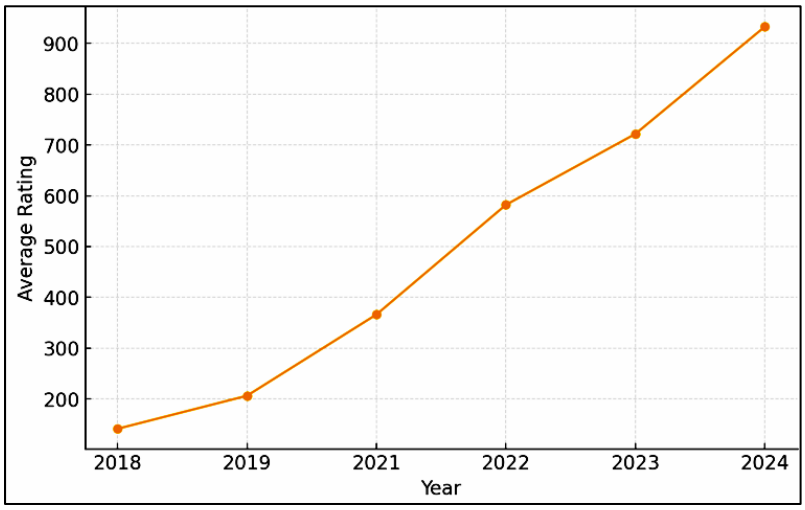


**Fig. 1. Average faculty rating trend (2018-2024)**

The median values also increase consistently, indicating that performance growth is not limited to a small elite group but extends to the entire academic staff. Furthermore, the widening distribution over time suggests that the evaluation system has become increasingly sensitive to performance differences. The emergence of a growing number of upper-range outliers indicates the formation of a group of exceptionally high-performing faculty members.

These findings are consistent with the literature emphasising that digitally institutionalised performance monitoring systems encourage continuous professional development and instructional innovation (Daniel, 2015; Siemens & Gasevic, 2012). The observed upward trend confirms Hypothesis H2 and demonstrates that the academic staff evaluation system at ASPU has evolved into a stable, development-oriented instrument of digital governance.

The inter-year correlation heatmap shown in Fig. 2 indicates a progressive increase in correlation coefficients from year to year. High correlations observed during the 2021–2024 period ($r \approx 0.80–0.90$) confirm that the rating system has reached a mature, stable institutional structure. In contrast, relatively weaker correlations between 2018 and 2019 indicate an early transition phase in the calibration of the digital evaluation system.

  

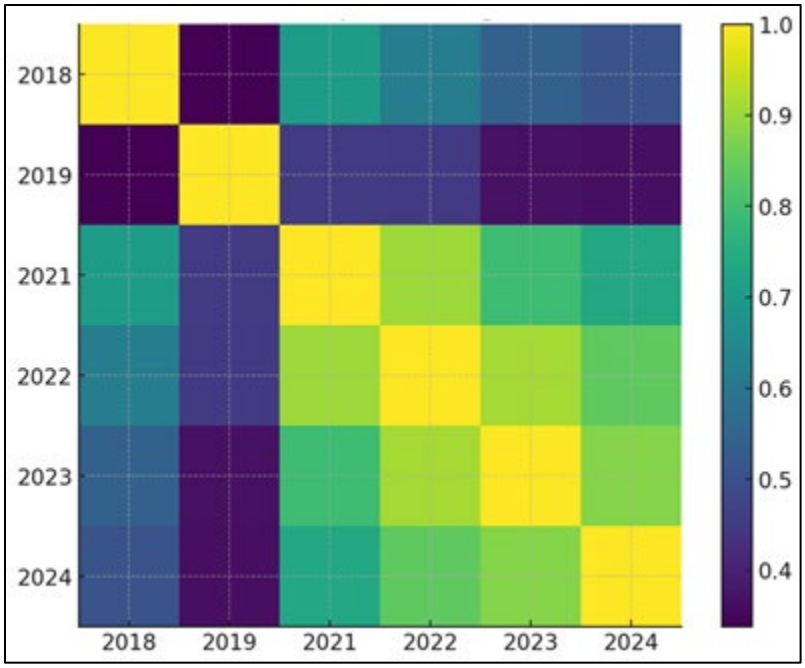


**Fig. 2. Correlation heatmap of rating (2018-2024)**

This stabilisation process aligns with theoretical models of digital system institutionalisation, which emphasise the importance of organisational learning and regulatory alignment during early implementation phases (Schildkamp et al., 2013). The results empirically validate Hypothesis H6 and confirm that the evaluation model has achieved high predictive reliability.

The frequency distribution of rating scores shown in Fig. 3 exhibits a pronounced right skew. The majority of faculty members are concentrated within the 0–1500 range, indicating a broad, stable performance band. At the same time, a long right tail indicates the existence of a limited number of exceptionally high-performing academics.

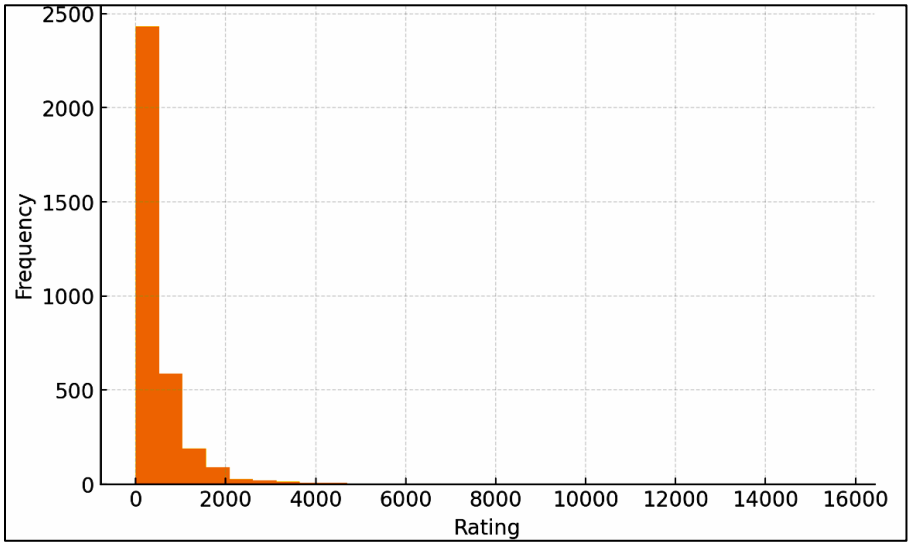


**Fig. 3. Overall distribution of academic rating scores (2018-2024)**

Such distributional characteristics indicate that the system simultaneously stabilises general academic performance while maintaining sensitivity to elite professional excellence. Similar performance clustering effects in digital evaluation systems have been reported by Wilsdon et al. (2015) in their analysis of metric-based academic governance.

  

The gender-based comparative analysis shown in Fig. 4 indicates that female faculty members consistently receive slightly higher average rating scores across most academic years. However, both male and female performance indicators exhibit a steady parallel upward trend, and the observed gender gap remains small but stable.

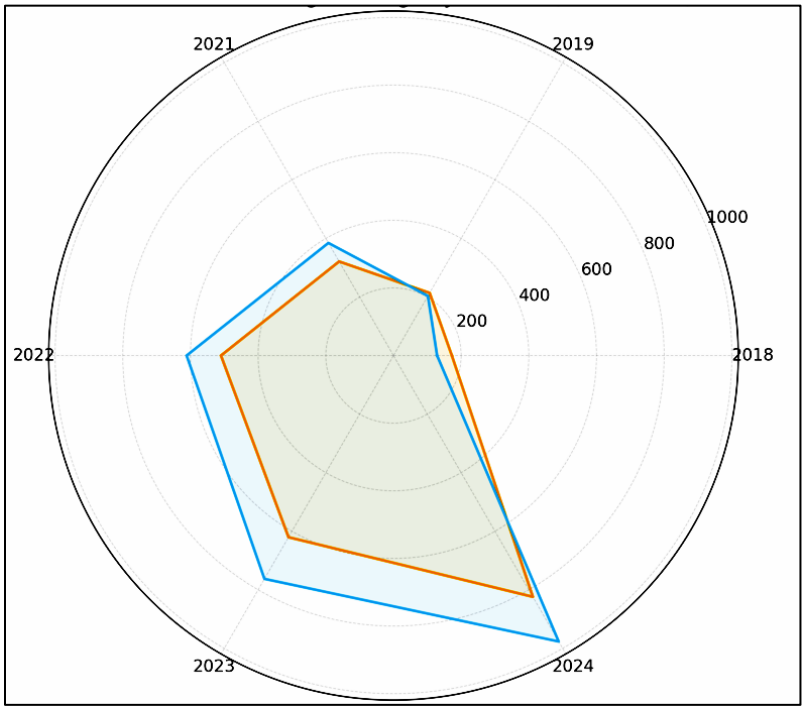


**Fig. 4. Average ratings by gender (2018-2024): red line – male, blue line - female**

The persistence of higher average performance among female faculty may reflect differences in instructional engagement, responsiveness to feedback, and student-centred teaching approaches, as discussed by Spooren et al. (2013). These findings empirically support Hypothesis H3 and indicate a balanced and inclusive institutional performance environment.

Age-based performance trajectories presented in Fig. 5 indicate that the 30–39 age group exhibits the most significant performance growth and achieves the highest average rating scores by 2024. The 40–49 and 50–59 groups exhibit stable, continuous increases in performance, whereas the 60+ group shows slower growth. The <30 group improves progressively but remains at a lower baseline due to early career positioning.

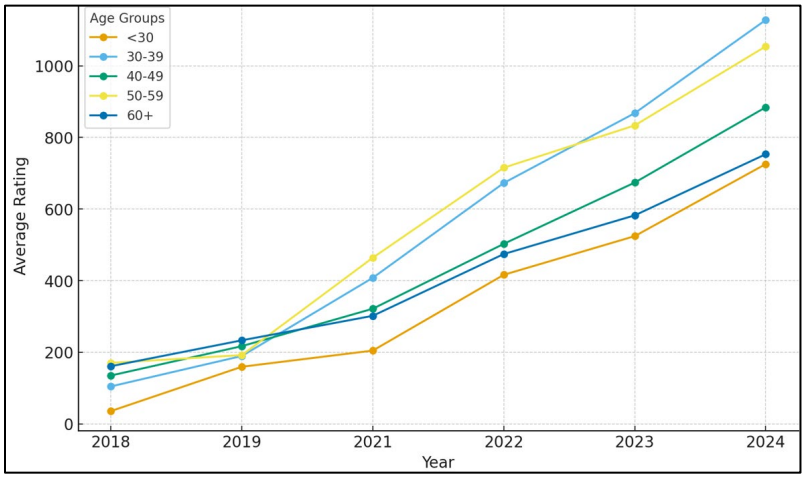


**Fig. 5. Average rating trends by age groups (2018-2024)**

  

These dynamics reflect classical academic career development patterns, where early-career faculty gradually build performance capacity, mid-career faculty reach peak productivity, and senior faculty maintain stable contribution levels. The findings strongly support Hypothesis H4 and align with previous results on academic performance life cycles.

The scatter plot in Fig. 6 shows a strong positive linear relationship between student feedback scores and composite academic staff ratings. Faculty members with 90–100% feedback consistently achieve the highest performance ratings, while instructors in the 50–70% feedback range predominantly remain within the lower rating intervals.

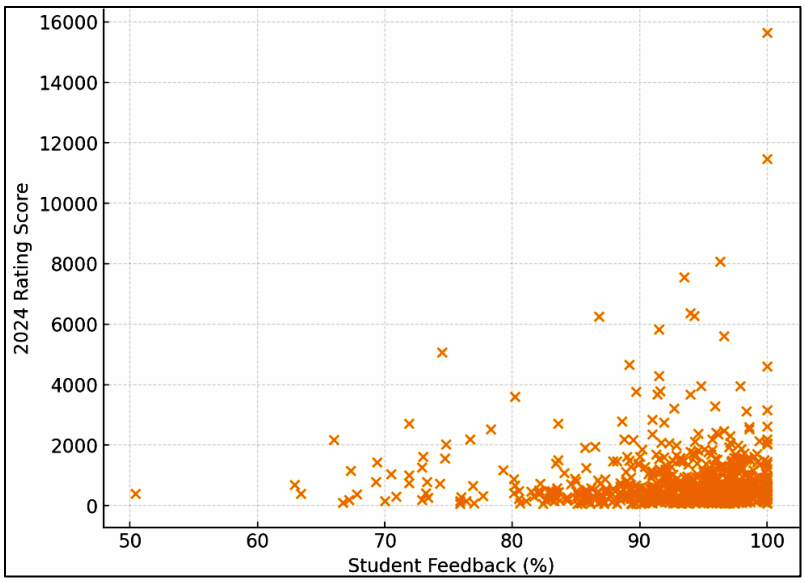


**Fig. 6. Student feedback and 2024 rating**

These results provide strong empirical support for Hypotheses H1 and H5, confirming that student feedback functions as a structural predictor of academic performance rather than merely as an indicator of satisfaction. This finding is consistent with large-scale validation studies on the predictive validity of student evaluations of teaching (Spooren et al., 2013).

The feedback distribution shown in Fig. 7 indicates that the vast majority of feedback scores fall within the 90–100% range, indicating high overall student satisfaction. The distribution is right-skewed, with only a small number of instructors located in the lower satisfaction range (50–70%).

  

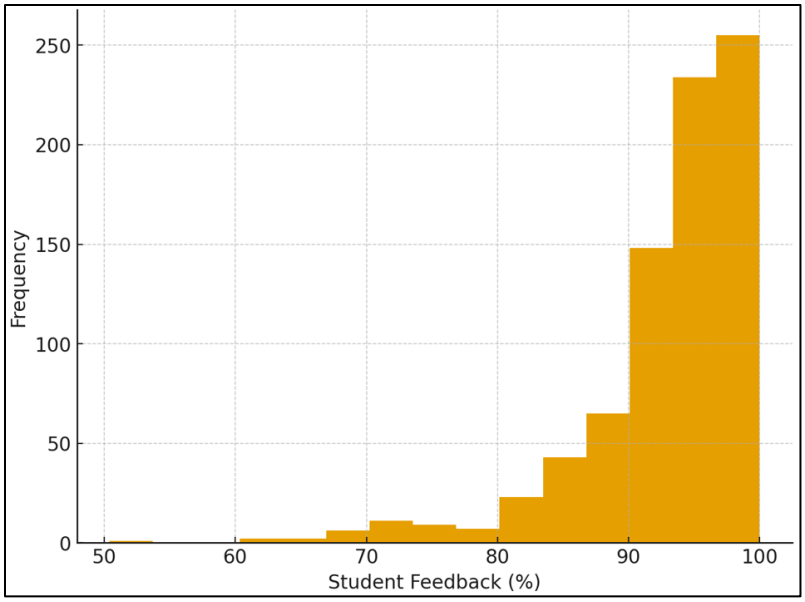


**Fig. 7. Distribution of student feedback scores 2024**

This pattern indicates that the teaching environment at ASPU is generally favourable. The small group of low-feedback outliers may be a suitable target population for targeted pedagogical support and intervention programs.

The overall rating distribution in Fig. 3 indicates that most academic staff are concentrated in the middle performance band, particularly in the 0–1500 range. This distribution creates a structurally stable and broad "middle mass". Fig. 4 shows that female teachers have slightly higher average ratings than men, and their performance distribution is denser and more stable. Analysing these two visuals together reveals the following results:

First, the slight advantage of female teachers does not contradict the overall distribution in Fig. 3; instead, the higher median score of women in Fig. 4 explains the concentration of the central mass in Fig. 3 in the stable medium-high performance zone. That is, the results for female teachers are both more tightly clustered and less dispersed, indicating more stable performance.

Second, there is more variability in the performance curve for men. This is consistent with the wide dispersion in Fig. 3. That is, there is a larger mass of both high and low performers among men. This heterogeneity is also confirmed by the more playful performance curve for men in Fig. 4.

Thus, Fig. 3 and Fig. 4 together show that female teachers exhibit a performance structure consistent with a "stable medium-high performance model". In contrast, male teachers exhibit a performance structure consistent with a "wide variability model".

The overall rating distribution shown in Fig. 3 indicates that most academic staff are concentrated in the average performance range. When analysing this distribution, accounting for performance dynamics by age group in Fig. 5 enables a more accurate interpretation of the performance structures. The interpretation of both visuals together is formed as follows:

First, the <30 age group starts the rating at a low level, and the distribution of this group in Fig. 3 essentially corresponds to the lower segment. This is explained as a natural consequence of the early-career stage: teachers have not yet gained experience and have not yet developed a portfolio of academic activities.

In contrast, the 30–39 age group has both the fastest growth dynamics in Fig. 5 and is the primary "carrier" of the right-sloping high-performance tail observed in Fig. 3. The sharp increase in the performance of this group indicates that they have already entered the peak of productivity in terms of both pedagogical and scientific activity. This age group plays the role of the "main driving force" in the university rating system.

  

The 40–49 age group exhibits a stable, rising trajectory in performance. Their location in Fig. 3 is more consistent with the middle mass. Since this group is at a mature stage in both experience and methodological mastery, the rating distribution is characterised by stability and reliable performance.

The 50–59 age group also shows an increasing but more moderate dynamic. Their representation in the middle of the right tail in Fig. 3 indicates a combination of extensive years of experience and stable, high performance. In this group, variability is minimal, and the results are consistent.

Finally, the 60+ age group shows a slower rate of growth and aligns with the lower-ranking segment in the distribution in Fig. 3. This is a natural feature of the career stage, as performance growth continues in a more stable, rather than dynamic, manner.

Thus, the right-skewed structure of the rating distribution in Fig. 3 is attributable to the high dynamism of the 30–39 age group and the stable, high performance of the 40–49 age group. The 20–30 and 60+ age groups are located in the lower and middle parts of the overall distribution, confirming that performance heterogeneity is related to the natural career cycle.

When Fig. 6 and Fig. 7 are considered together, parallel and mutually complementary findings emerge, confirming that student feedback is a key structural predictor of teacher performance. The comparative observations presented in the table can be interpreted in academic terms as follows:

First, Fig. 6 shows a strong positive linear relationship between student feedback and academic ratings: teachers who receive high levels of student feedback consistently receive higher ratings. These data suggest that student satisfaction is not merely an emotional construct but a direct indicator of the quality of a teacher's instruction, course organisation, and pedagogical effectiveness. Thus, empirical evidence confirms that student feedback is a reliable predictor of academic performance.

The distribution of student feedback in Fig. 7 complements this relationship. The figure shows that most of the input falls within the 90–100% range, indicating a right-skewed distribution and generally high student satisfaction. The relatively small number of teachers receiving low feedback accounts for the presence of a small risk group concentrated in the low-rating segment in Fig. 6. It is easier for this group of teachers to implement targeted methodological support and professional development programs, since they are not numerous and the problem is clearly identifiable.

Together, these two figures reveal a broader conclusion: the high ratings of teachers who receive high feedback are not just a random coincidence, but a systematic and persistent trend. On the other hand, the high and dense distribution of student feedback (Fig. 7) suggests that the teaching environment at the university is generally positive and that students rate the vast majority of teachers highly. In parallel, the low feedback-low rating relationship in Fig. 6 strengthens the psychometric validity of student feedback as a measurement tool.

Thus, the mutual analysis of the two visualisations shows that student feedback is not merely an additional indicator in the ASPU academic assessment system, but a structured, stable, and predictive component of teacher performance. This result is entirely consistent with both the international literature and the theoretical foundations of digital monitoring systems.

It contrasts four key indicators that demonstrate how ASPU's digital academic assessment system has matured over the years: long–term growth in ratings, stability of inter-year correlations, the predictive value of student feedback, and the structure of overall student satisfaction. Each of these indicators and the results they produce at the system level can be explained as follows:

The first indicator, the annual rating increase observed in Fig. 1, confirms that teacher performance is not just temporary but shows a consistent and sustainable increase. The increases in both the average and median ratings over the years indicate a broad-based development process among the academic staff. This result suggests that the system has already become a management tool capable of creating behavioural changes, thereby having a real impact on teachers' teaching, research, and service activities.

  

The second indicator, the high inter-annual correlation shown in Fig. 2, indicates that the system measurements have stabilised and the results can be reliably replicated, especially since 2021. A high correlation indicates strong agreement in measuring teachers' performance indicators across two consecutive years, indicating that the assessment tool is no longer susceptible to random variation and operates on a stable methodological basis.

The third indicator, the predictive role of student feedback on academic performance, as determined in Fig. 6, indicates the high psychometric quality of the system. The finding that academic ratings increase with student feedback confirms the structural validity of the digital assessment model. This means that the system not only conducts statistical monitoring but also uses relevant and meaningful variables to measure the quality of teacher instruction.

The fourth indicator, the high and stable student satisfaction observed in Fig. 7, indicates that the overall learning environment is favourable. The fact that the vast majority of student feedback is collected in the high range indicates both the quality of the learning process and the strength of student-teacher interaction. This structure strengthens the system's internal balance and fosters a conducive pedagogical environment for teacher development.

Together, these four indicators demonstrate that ASPU's digital academic assessment system is not merely a data-collection mechanism but a mature, sustainable, and reliable management tool. The system both stimulates performance growth and provides a stable, predictable basis for institutional decision-making.

The overall rating distribution shown in Fig. 3 exhibits a right-skewed tail in academic staff performance, indicating that high-performing teachers are concentrated at the right end. This structure suggests that an “elite high-performance group” has formed within the university. This group demonstrates remarkable results in research, pedagogical quality, and social and institutional services. Such a right tail is the most typical indicator of performance heterogeneity, indicating that the system can distinguish not only average results but also individual preferences.

Second, Fig. 4 shows the performance differences by gender. The figure shows that the average performance of female teachers is slightly higher than that of male teachers and exhibits a more stable trajectory. This suggests that performance heterogeneity is also observed across gender. As highlighted in the table, a more stable pattern of medium-to-high performance has emerged among female teachers. In contrast, a broader range of performance is observed among males, including both very high and relatively low results. This wide variation indicates that heterogeneity is more substantial among males.

Third, Fig. 5 presents performance dynamics across age groups and indicates how heterogeneity is associated with career stages. Here, the 30–39 age group shows the most significant increase in performance, and the right tail (high-performing group) appears to be primarily composed of this group. The 40–49 age group shows stable, high performance, whereas the 50–59 age group shows similarly stable but more gradual increases. The <30 and 60+ age groups are more represented in the lower and middle parts of the overall distribution.

Thus, these three indicators together confirm that the system can measure not only overall performance but also its internal structure, stratification, and diversity. Performance heterogeneity is closely related to individual characteristics (e.g., gender), career stages (e.g., age), and individual development rates within the broader academic environment. This indicates that the rating system has both the potential for differential assessment and the power to support decision-making in institutional management.

Overall, the findings demonstrate that the academic staff evaluation system at ASPU exhibits:

- Strong longitudinal stability,
- High predictive reliability after institutional calibration,
- A robust structural relationship between student feedback and academic performance,
- Statistically meaningful performance differences across gender and age groups.

These results confirm that the learning analytics-based evaluation system has evolved into a mature digital quality assurance mechanism that not only monitors academic performance but also actively regulates professional development dynamics within the institution.

  

**Conclusion**

This study examined the relationship between student feedback, composite academic staff rating scores, and demographic variables within a learning analytics-based evaluation system using longitudinal data from 565 faculty members (2018–2024). The findings reveal a consistent upward trend in academic staff performance and confirm that student feedback is a strong structural and predictive determinant of overall academic performance. Gender- and age-based analyses indicate that female faculty members demonstrate slightly higher average performance, while the 30–39 age group exhibits the strongest performance dynamics. Inter-year correlation results indicate that the digital evaluation system exhibited high institutional stability and predictive reliability after 2021. Overall, the findings confirm that learning analytics-based academic staff evaluation systems function as continuous, data-driven, and development-oriented quality assurance mechanisms that support sustainable academic quality and evidence-based governance in higher education.

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